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DEPARTMENT OF DEFENSE
LAND FALLOUT PREDICTION SYSTEM

Volume VII - Operator's Manual

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ABSTRACT

This volume of the DELFIC (Defense Land Fallout Interpretive Code) documentation is intended to serve as a complete operator's manual to be used at a computing center by personnel responsible for the execution of production computations. It includes material presented in the program Description and User Information Sections of Volumes II through VI. In addition to this material it also contains detailed information on certain aspects of the DELFIC system that could not appropriately be included elsewhere. It is assumed that the user is familiar with the IBSYS operating system of the IBM 7094.

FOREWORD

This volume constitutes a complete rewriting and updating of the Volume VII Draft prepared by Technical Operations, Incorporated, with the original draft serving as an effective outline. During the course of the construction of this Operator's Manual much information has been gleaned from a variety of sources.

The author would like to express his appreciation to Mr. R. C. Tompkins of this Laboratory for his invaluable technical assistance concerning the details of machine implementation of the DELFIC code.

CONTENTS

DEPARTMENT OF DEFENSE
LAND FALLOUT PREDICTION SYSTEM

1. INTRODUCTION

This volume is intended to serve as a complete operator's manual to be used at a computing center by personnel responsible for the execution of production computations. It includes material presented in the Program Description and User Information Sections of Volumes II through VI. In addition to this material, it also contains detailed information on certain aspects of the DELFIC system that could not appropriately be included elsewhere.

In the following sections we describe how the complete DELFIC system is organized for operation on the IBM 7094 computer under control of the IBSYS-IBJOB processor. Any user must become thoroughly familiar with this material before he attempts to run the system on the IBM 7094 computer or on any other computer.

1.1 Modularity and Overlay Structure.

The DELFIC System has been prepared with the FØRTRAN IV language and has been organized into six distinct portions (modules) which perform the computations associated with various portions of the fallout process. Each of the six modules is controlled by its own executive program to coordinate and direct the calculations required within each of the fallout stages. The entire collection of modules is linked together by a single main executive program (M3).

The DELFIC system is executed under control of the IBSYS-IBJØB Processor on the IBM 7094 computer and makes extensive use of the overlay and labeled CØMMØN features of the processor. Figure 1.1 has been prepared to aid the user in understanding just how DELFIC uses these features and how it represents the many states of computer memory during a complete run (beginning on the left with the Initial Conditions Module and ending on the right with the Output Processor Module). The top of the figure represents the low-numbered end of memory and the bottom represents the high-numbered end. At the top of the figure the area marked SYSTEM represents about 3000_{octal} words of memory taken by the processor during

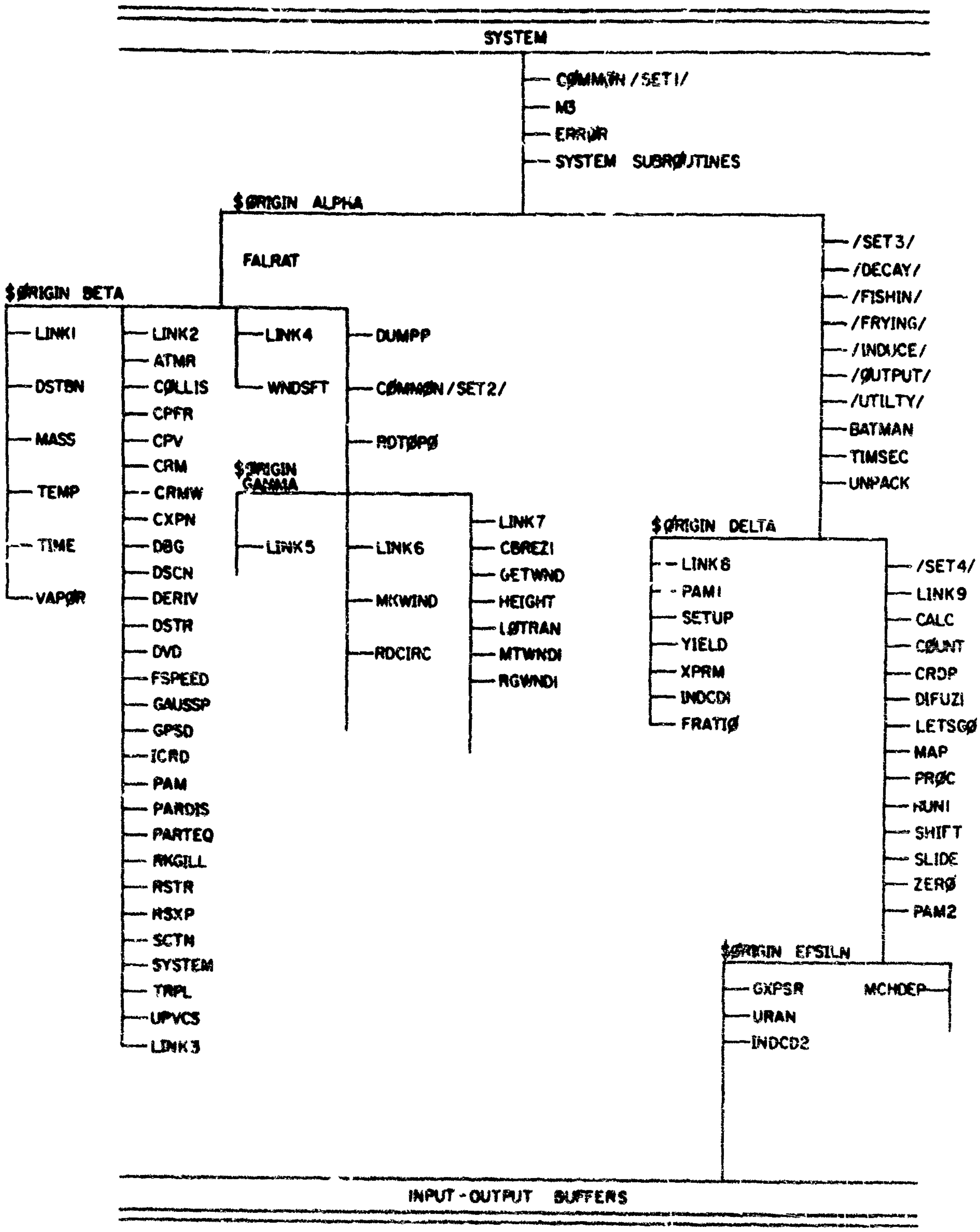

Figure 1.1 Memory organization of DELFIC.

program execution. The memory used by DELFIC begins just below this system area. CØMMØN /SET1/ is a small set of CØMMØN potentially available to all programs of DELFIC. Loaded numerically just above CØMMØN /SET1/ is the DELFIC executive program (M3), the generalized error stop program ERRØR, and all required FØRTRAN IV library subroutines. All of the foregoing remain in memory throughout an execution of DELFIC.

The memory addressed numerically upward (downward in Figure 1.1) from the location marked ØRIGIN ALPHA is used repetitively to store the programs and data of the various other subroutines of DELFIC on a time-shared basis. The execution of a complete DELFIC run proceeds as follows:

First, CØMMØN /SET1/ is defined and the executive program, the generalized error stop program, and the system subroutines are loaded. Then FALRAT is loaded from ØRIGIN ALPHA. Next, LINK1 and its associated subroutines are loaded starting at ØRIGIN BETA and executed. The, LINK2, its associated subroutines, and dummy LINK3 are loaded into memory starting once again from ØRIGIN BETA, thus destroying the LINK1 code but not the LINK1 results which are recorded in CØMMØN /SET1/. LINK2 results are recorded on magnetic tape (IRISE). LINK4 and WNDSFT are then loaded from ØRIGIN BETA, all the codes of LINK2 being destroyed in the process. When LINK4 has been executed and its results written on tape (JPARIN), CØMMØN /SET2/, DUMPP, and RDTØPØ are loaded from ØRIGIN BETA. LINK5, LINK6, and LINK7 are loaded in sequence from ØRIGIN GAMMA as many times as are required for the execution of the transport module. All communication among them is carried out via the CØMMØN blocks. Communication to the next module is by tape IPØUT. During execution of the two parts of the output processor and the two parts of the particle activity module, ØRIGINS ALPHA, DELTA, and EPSILN are used, and interprogram communication is provided by the CØMMØN blocks shown in Figure 1.1.

It should be noted that IBJØB uses the memory numerically above the highest addressed program for certain required input-output buffers. In total, considerable memory space is preempted by IBSYS-IBJØB. The execution of DELFIC is restricted to machines having at least 32,768 core memory words, at least six tape units, and an on-line printer.

1.2 Execution Time.

The DELFIC programs described here have been executed in both Models I and II of the IBM 7094 computer. It has been observed that on the IBM 7094 Model II a reasonably taxing execution involving about twelve thousand cloud subdivisions in transport for a 1 kt detonation will take about 15 minutes to proceed through the six modules, whereas for a 15 Mt detonation with 191,000 cloud subdivisions the calculations through the transport module (LINK7) required 3.6 hours.

Execution times, particularly of LINKS 4 and 9, are very much data-dependent and should be estimated with extreme caution. In general the execution times of these programs will increase with the number of cloud subdivisions, the number of wind field updatings, and the number of map grid points that are printed. Experience has indicated that the execution time for LINK9 (Output Processing) will run about 15 minutes for each large scale map printed. A considerable decrease in running time is to be expected if DELFIC is modified for use in a machine having primary memory larger than 32,768 words or having high-speed peripheral storage.

1.3 Modifications for Different Machines.

1.3.1 Larger Core Memory. For computers with more than 32K core memory, efficiency can be gained by expanding certain arrays. In the transport Module (fourth ØRIGIN BETA, starting from DUMPP), increase the dimensions of XP, YP, ZP, FMAS, TP, and PS, now set at 200. Correspondingly, the value of NALØFT should be set higher at Sequence No. 396 of LINK5. In the Output Processor (second ØRIGIN ALPHA, starting from BATMAN), increase the dimensions of FMAS, KTR, PS, T, X, and Y, now set at 500, in CØMMØN/SET3/. (In BATMAN, CØMMØN/SET3/ has only one dummy array which must absorb the total increase.) Correspondingly increase the value of MARRAY at Sequence No. 190 in LINK8. In the second ØRIGIN DELTA, starting from LINK9, increase the dimension of ØMAP in CØMMØN/SET4/, now set at 4000, along with the value of NMAP at Sequence No. 192 in LINK8. These modifications will reduce the use of peripheral storage called for by the open-ended programming.

1.3.2 Smaller Available Core Memory. Some installations have larger blocks of utility programs permanently in memory than others. The largest overlay segment is the third ØRIGIN BETA, starting from LINK4. If this segment exceeds available memory, the program should be modified to make

LINK4 a simple executive program calling WNDSFT and a new subroutine comprising the computation portion of LINK4. These subroutines could then overlay each other at a new ØRIGIN, communicating by a new CØMMØN block.

1.3.3 High-Speed Peripheral Storage If disc or drum storage is available, see the section on File Units for suggested modifications.

2. PROGRAM AND INPUT SUMMARY

2.1 The Executive Program.

The executive program (M3) of DELFIC is the only "main" program in DELFIC, and all other programs called directly or indirectly by it are subroutines. The executive is small and remains in core memory at all times during execution. Thus, it is well situated to call for the execution of the various DELFIC modules, each of which was written more or less independently to use nearly the full capability of the computer. It is also well situated to control the action of computer operators as needs arise for data tapes to be mounted or dismounted. It is anticipated that this program, already in its third version, will be one of the more frequently modified programs of DELFIC.

Figure 2.1 presents the normal flow sequence of the DELFIC executive program. The main executive program reads two cards - the first of which must always be on logical 5. This card assigns the logical file for the utility input unit, ISIN. The format is (16X, I2) and it is conveniently punched, beginning in column 1, as

ISIN IS LØGICAL nn

where nn is the assigned number. The second card determines which modules are to be executed and is read from ISIN. The beginning and ending modules are punched in format (12X, I2, 6X, I2). A convenient form, beginning in column 1, is

USE MØDULES XX THRU YY

which causes the execution of DELFIC to commence at LINKXX and continue in normal sequence through LINKYY. Before actually calling each module, the executive prints on-line

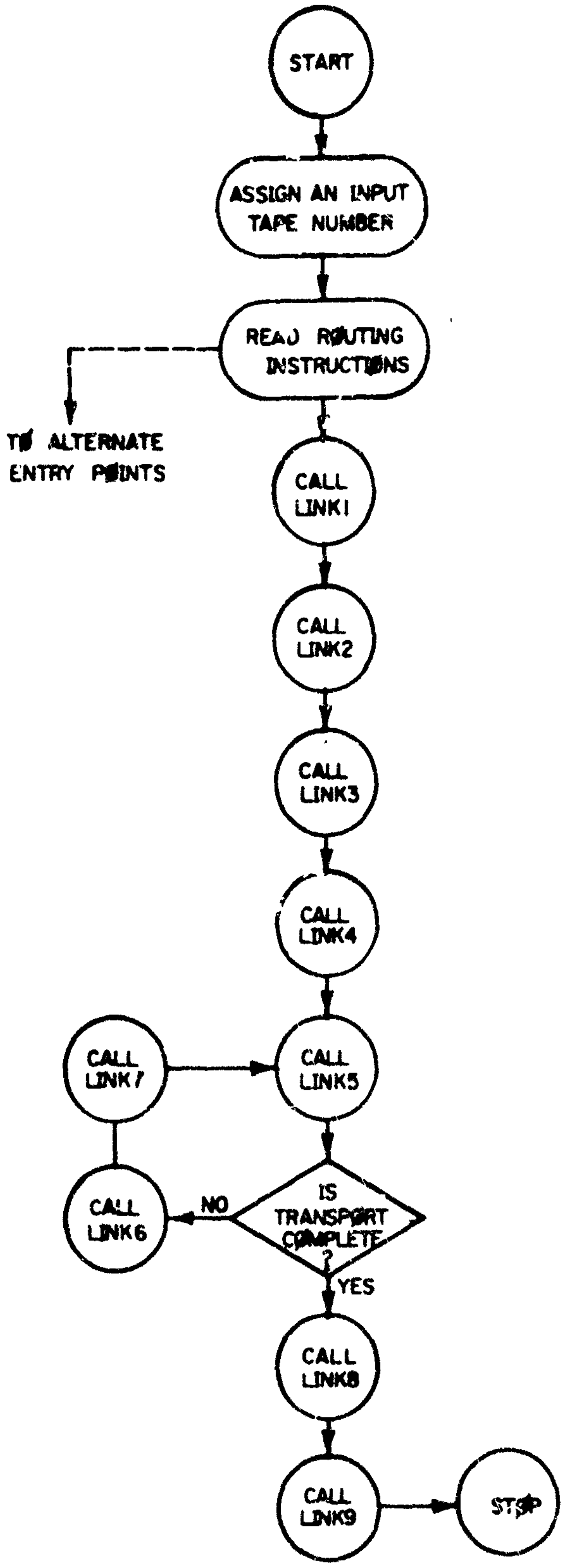

Figure 2.1 Normal flow sequence of DELFIC executive program M3.

and off-line the comment "ENTERING LINKNN" where NN is the number of the module about to be executed.

2.2 Initial Conditions.

The Initial Conditions Module computer program consists of an executive program (LINK1) and five computation subroutines. The Initial Conditions Module is designed for two purposes. First, it can be used merely to compute and print the values of initial condition parameters for an unlimited number of data sets. Second, it can compute a single set of parameter values and then cause cloud-rise computations to proceed. A flow chart of the Initial Conditions Module computer program logic is presented in Figure 2.2. Because LINK1 executes so quickly, no storage of intermediate results on tape is necessary.

The following inputs to the Initial Conditions Module are required:

1. Weapon yield.
2. Height of burst.
3. Type of soil (siliceous or calcareous).
4. Pre-shot soil size - frequency distribution.

2.3 Cloud Rise.

The Cloud Rise Module computes histories of the rise, growth, temperature, and composition of a nuclear cloud throughout virtually the entire period of its rise. The calculations are directed by the cloud rise executive program (LINK2) and can be considered to be divided into three parts. The first is carried out by subroutine CRM and its associated programs; the second is carried out by subroutine GPSD; the third is carried out by subroutine RSXP and its subprograms.

Communication between the Cloud Rise Module and other DELFIC modules is accomplished via storage and magnetic tape. All inputs from the Initial Conditions Module are transmitted via CØMMØN/SET1/. In addition to the LINK1 inputs, the following information must be supplied:

1. Elevation of ground zero.
2. Soil solidification temperature.
3. Fission yield.
4. Altitude of tropopause.
5. Fallout particle density.
6. Atmosphere data.

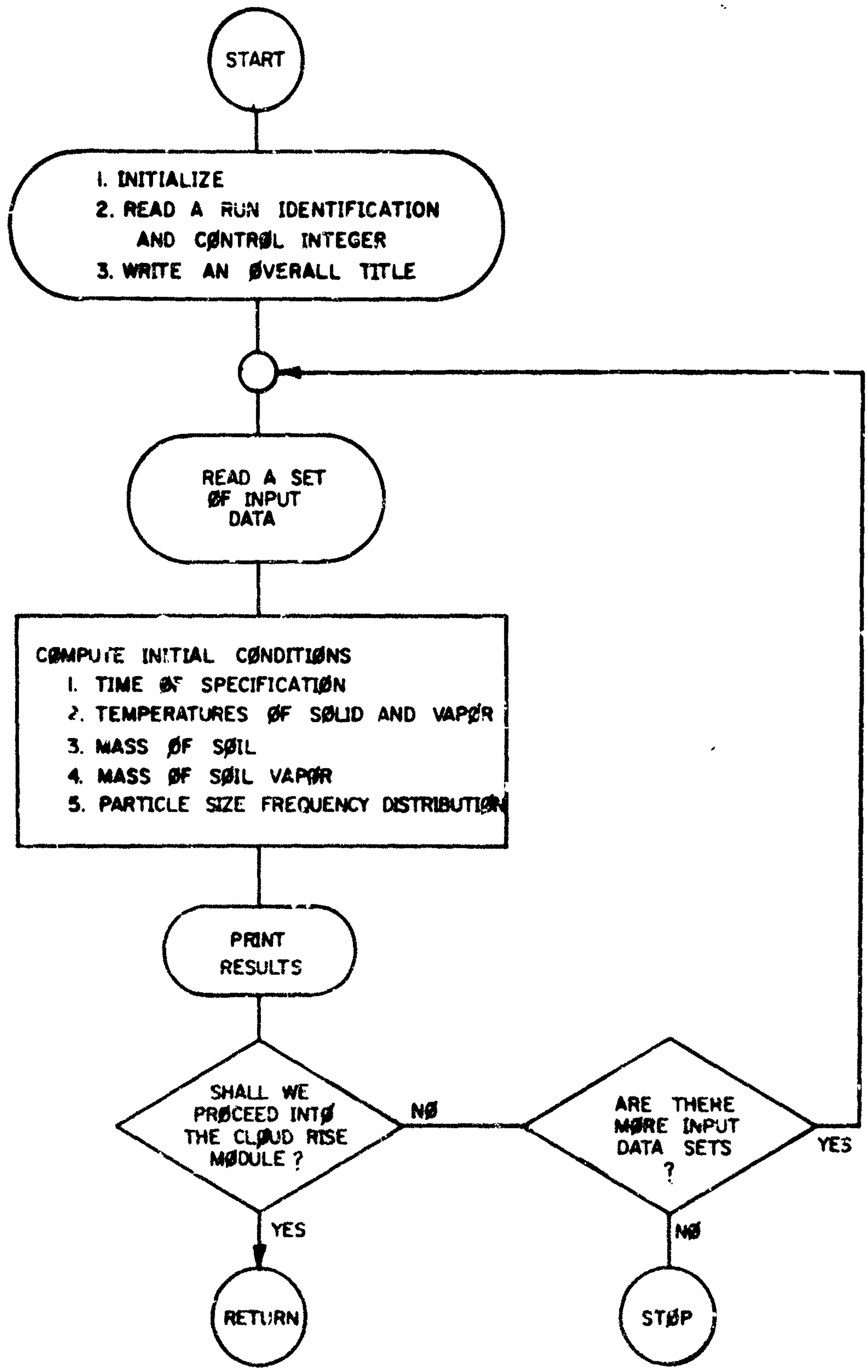

Figure 2.2 Flow chart of the initial conditions module computer program logic (LINK1).

2.4 Cloud Rise - Transport Interface.

The Cloud Rise - Transport Interface Program consists of an executive program, LINK4, and subroutine WNDSFT. The Cloud Rise - Transport Interface Module (CRTIM) was originally constructed to create a three-dimensional input for the Transport Module from a detailed two-dimensional cloud-rise calculation. The CRTIM is designed to accomodate both a two- and three-dimensional spatial distribution of particles as input. For the latter case, the only work required of the CRTIM is to correct the horizontal coordinates of the particles for wind drift during cloud rise. In the present version of DELFIC, the Cloud Rise Module provides inputs to the CRTIM in this form, and it is not necessary to exercise the major part of the CRTIM. An organizational chart of program LINK4 is presented in Figure 2.3. In accordance with the present DELFIC system, option (a) in that figure is executed.

The inputs to the CRTIM come from CØMMØN Core storage, from binary mode magnetic tape written in LINK2, and from cards via the IBSYS system input tape. The externally supplied data (the latter of the three input categories) includes the following information:

1. Location of ground zero.
2. Detonation time.
3. Wind field data.

2.5 Atmospheric Transport.

The Transport Module essentially consists of three major program sections:

LINK5: Initialization and control.
LINK6: Wind field description.
LINK7: Particle transport.

Figure 2.4 shows the arrangement in which the computations required during the transport period are grouped for execution. Note that final exit from LINK5, the transport executive, is made to a program called LINK8 - the Output Processor.

Two basically different forms of topography in regions not covered by local circulation systems may be specified for use by the Transport Module. They are

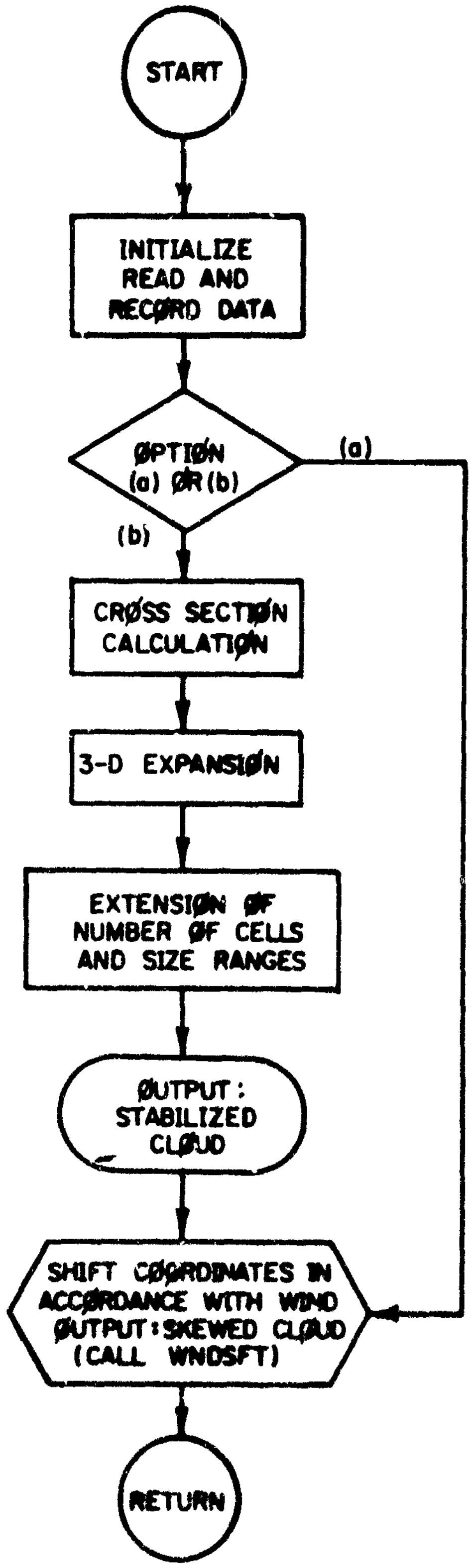

Figure 2.3 Gross organizational chart of program LINK4.

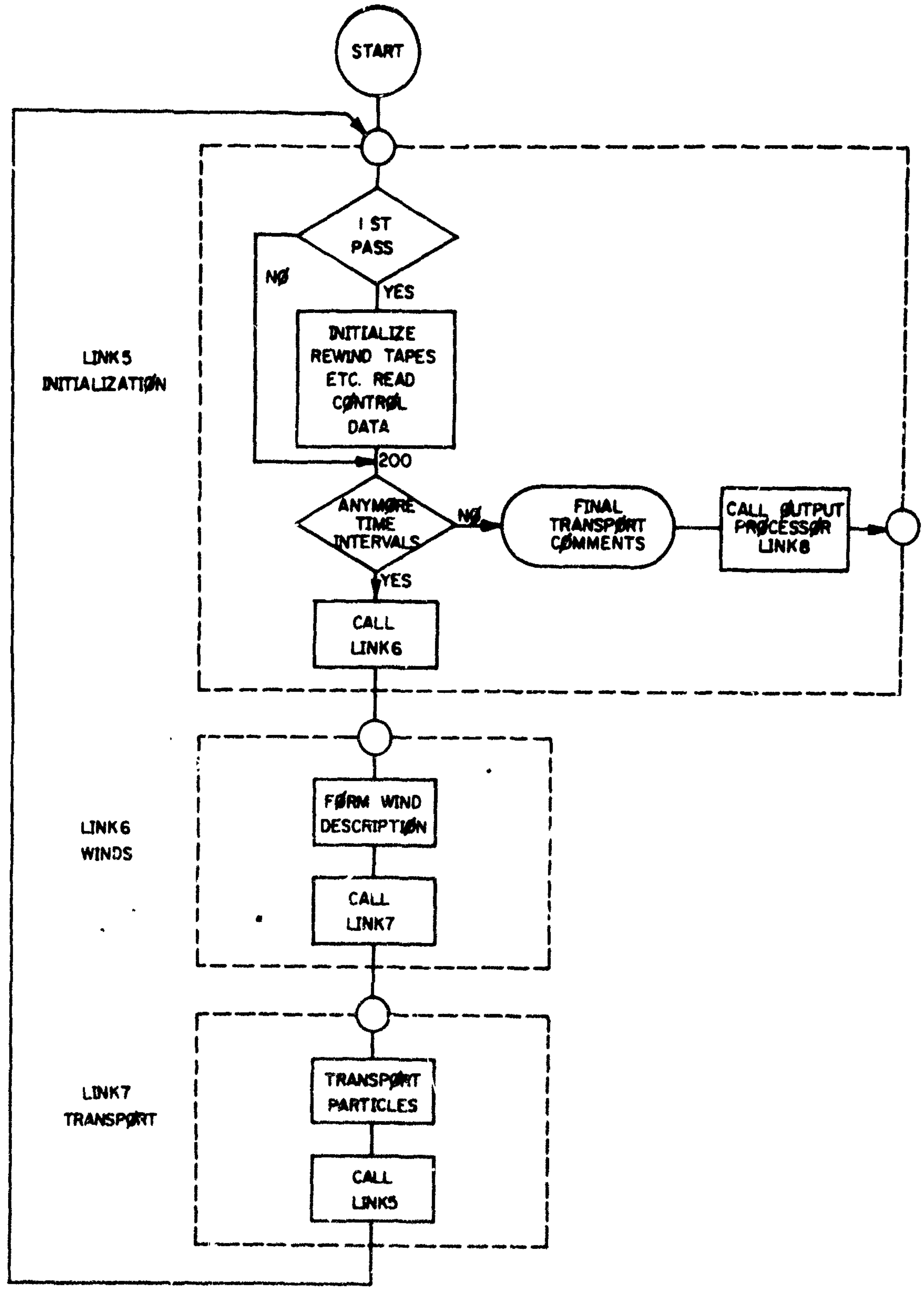

Figure 2.4 Program arrangement for the transport module.

referred to here as fully planar topography (a single plane), and piecewise planar topography (many segments of planes). In the fully planar option, the program merely reads from a card the height of the planar topographic surface and uses it throughout transport. If the piecewise-planar option is specified, the program expects that a topographic data tape has been prepared and is available for use.

The Transport Module obtains information from the preceding module via a binary tape output in addition to card inputs read from the system input tape. The card input includes a transport time limit as well as various sets of wind field data.

2.6 Particle Activity Module.

The function of the Particle-Activity Module (PAM) is to generate a table of activity versus particle size for DELFIC. Unlike other fallout prediction systems that input a wholly empirical particle-activity distribution, DELFIC, by means of the PAM, uses a model of radiochemical fractionation. DELFIC also differs from other fallout models in that it does not approximate fission-product decay by the $t^{-\alpha}$ relationship. The PAM rigorously computes the decay of each fission product by $e^{-\lambda t}$.

The PAM has the following inputs:

1. A table of the radioactive transitions of the fission products, including half-lives and branching ratios.
2. A table of fission yields for the selected type of fission.
3. A table of exposure-rate multipliers.
4. A table of soil constituents and their nuclear properties.
5. The number of neutrons emitted per fission and the capture-to-fission ratio.
6. The weapon yield and height of burst.
7. The solidification temperature of the soil and the time at which the cloud reaches that temperature.
8. The particle-size distribution.

The first four of these are direct card (or tape) inputs; the rest are supplied by other modules of DELFIC.

The output of the PAM depends upon user options.

The PAM is divided into two sections. The time-independent section resides in LINK8 and is executed only once for each set of burst conditions. The time-dependent section is included in LINK9 and may be executed repetitively during output processing.

2.7 Output Processor.

The Output Processor consists of two control programs and eleven subroutines. An extremely brief statement of the purposes of these programs is set forth in Table 2.1. In addition, the Particle Activity Module subroutines, PAM1 and PAM2 (see Volume V of this documentation), are called within the Output Processor.

It is suggested that the first things to be done in an unfamiliar prediction situation are to have the Output Processor print a hard copy of the grounded particles tape, and in addition, to call for a large-scale map to provide an overview of the fallout field. Both of these tasks can be carried out in the execution run that does the transporting. The grounded particles tape produced by the Transport Module and used by the Output Processor in the initial run may be saved and reused in subsequent runs of the Output Processor and Particle Activity Modules to produce any additional maps desired. In order to specify the first set of tasks, the user must set about a dozen control parameter values. One parameter (IC(18) > 0) causes the grounded particles tape to be printed. Another (IC(17) = 0) causes processing to continue after that printing has been finished. Four others (XMIN, XMAX, YMIN, YMAX) give the coordinate limits of the desired map. Two others (DGX and DGY) give the map point grid intervals in the X and Y directions. One other specifies that the map should be, for example, a map of exposure rate "normalized" to H + 1 hour (NREQ = 2).

In the second and subsequent execution runs after the printed list of grounded particles and the large-scale map have become available, the user may request that any number of more detailed maps be printed. These larger and more precise maps can, of course, portray any of the possible output quantities of the DELFIC system.

Figure 2.5 illustrates how a user may arrange his requested map areas and scale factors to expose prediction details of interest to him. Area coverages and map dimensions shown are merely illustrations and in no sense are

TABLE 2.1 OUTPUT PROCESSOR PROGRAM SYNOPSIS

Program Name	Purpose
LINK8	Initialization and liaison with subroutine PAM1 (Particle Activity Module) and LINK9.
LINK9	Interpret grounded particles into the output map array and call PAM2 (Particle Activity Module) for particle activities or mass chain concentrations.
CALC	Interpret grounded particles into the map array.
COUNT	Select the largest sorted data set for dumping onto memory tape.
CRDP	Subordinate control routine which calls SHIFT to clear out most of the particles array after a pass of the data tape has been completed.
DIFUZ1	Expands cloud subdivision areas to account for diffusion.
LETSGO	Control routine for the situation in which sorting onto tape is required.
MAP	Display the Output (Print the Map).
PROC	Subordinate control routine which eliminates unneeded particles, sorts and counts other particles, and calls CALC to interpret those falling within the current map area.
RUN1	Control routine for the situation in which no data sorting onto tape is required.
SHIFT	Collects a selected set of particle descriptions and writes them onto memory tape.
SLIDE	Slides the content of the right buffer zone over to the left zone in preparation for processing the next map zone.
ZERO	Collects bank lines at the top of the particles arrays in preparation for reading in more particle descriptions.

meant to imply any restrictions in the use of the Output Processor since their characteristics are completely under the control of the user. Map 1 is a large-scale overview that indicates the shape and location of the fallout field, but is necessarily crude because it is small (2x2 feet) and thus contains a small number of points. Maps 2, 3, and 4 represent much more precisely the predicted fallout field within 10 miles of ground zero. They are, for example, 6 by 6 feet in size and contain nine times as many data points as the overview (Map 1), but represent an area of the fallout field less than one-tenth as large as the overview. They may, for instance, portray predictions of mass deposition, exposure rate at H + 2 hours, and the concentration of mass chain 89. Maps 5 and 6 continue the representation of mass deposition but do so with less precision than that of Map 2 since they are about 4 feet long and cover larger fallout areas.

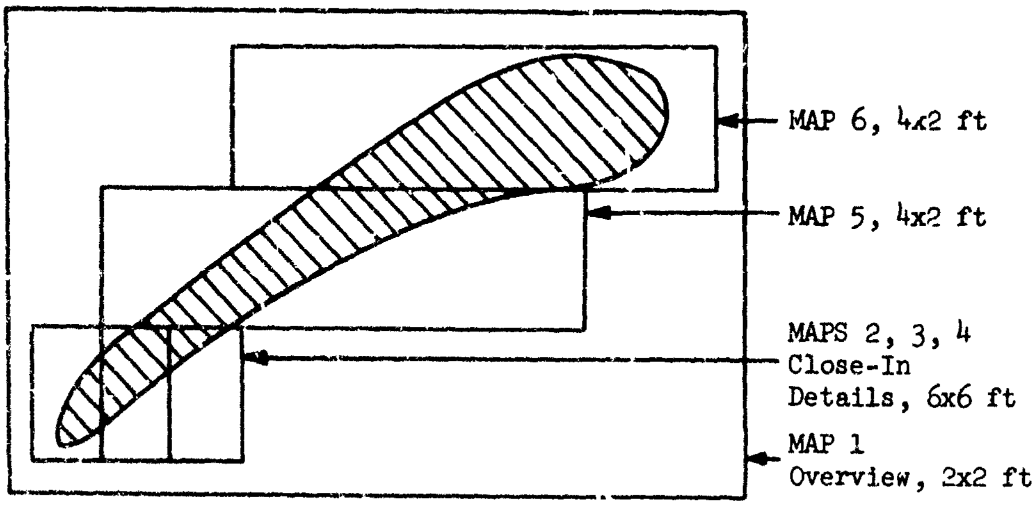

Figure 2.5 Map coverage example.

The task of arranging the card inputs to the Output Processor is not a complex one, but it does require that the user make certain decisions about what he wishes to have portrayed and how he wants it to be portrayed. He should know what coordinates were used to identify the location of ground zero within the transport module. He should know that all distances (coordinates) are measured in meters from the same coordinate origin. He should have at least a rough idea of the direction of the winds. Beyond that, he need only know which of the display options he wants portrayed.

The map produced by the Output Processor will consist of a sequence of numbered "strips" of printer paper that can be detached at the boundaries between successive strips and assembled side-by-side into a single map of the overall area covered by the specified map limits. When so assembled (the strips are numbered in sequence from left to right) and hung on the wall for viewing, the data point with maximum X and minimum Y coordinates will be found in the lower left hand corner of the map (i.e., the lower left hand corner of strip number one). The coordinates of this point will be (XMIN + DGX, YMIN + DGY). This point need not be either the origin of coordinates or ground zero.

2.8 Map Processing with Multiple Burst Options.

The map processing capability of DELFIC provides a means whereby small numbers of maps resulting from either the same or different Output Processor runs may be combined. The map processor allows the user to do such things as predict the radiological effect of multiple bursts, predict the ratios of the concentrations of pairs of nuclides in the fallout particles at each map point, and predict other ratios of interest. For example, if he wishes to achieve a multiple burst prediction, the user must have previously run the Output Processor Module with a specification that the multiple burst option is to be exercised for each one of the weapons (or ground zeros) that he wishes to combine. This option (JC(1) = 3) causes a binary map tape to be written automatically so as to contain all the information normally printed on the map produced by DELFIC. A subsequent execution of the Program MULTIB performs the actual addition of two map tapes and either prints the summed map, writes a third map tape that contains the summed map so that other burst effect maps may be added to it, or both prints and writes. For multiple burst predictions,

program MULTIB simply adds two DELFIC maps together (as is done for a pair of two-dimensional matrices) and either prints the resulting map or writes it out onto tape for subsequent use.

Implicit in the notion of simply adding maps together is the assumption that there is no interaction between the processes that are being modeled. Clearly, if weapons detonate too close together in space and time, there will be circulation interaction. Thus it should be clearly understood that the DELFIC multiple burst capability is appropriate only for detonations that are not too close to each other in space and time. In addition to this restriction on the multiple burst "model" there are other restrictions, perhaps less permanent but equally real, due to the mechanism that is provided for map additions. As in matrix addition, where the matrices to be added must be of the same order, the maps must be made up of the same number of rows and columns of numbers. Furthermore, the manner in which the map data is structured as it is written onto tape (by the Output Processor) must be identical for all maps to be added. For this purpose map pairs are considered to be identically structured if the corresponding values of XMAX-XMIN, YMAX-YMIN, DGX, and DGY are equal for the members of the pair. Also, the maps to be added should obviously be logically addable, i.e. one should not attempt to add doses to dose rates or concentrations to wafer counts.

It should be noted that the addition program does not require that the map tape pairs be produced with identical map coordinate coverage. While MULTIB might have been easily written to preclude attempts to add together maps covering different grid points (but having the same size and shape), it was felt that to do so would have been unduly restrictive. Therefore, the researcher may, if he wishes, effectively add a deposition pattern to itself, offset to any desired degree by means of separate Output Processor runs, without rerunning the time-consuming transport program.

As it was originally written, MULTIB had only one purpose - to provide a multible burst prediction capability. However, it was soon recognized that MULTIB was well situated to do a number of other things of value and so MULTIB was expanded and to some extent generalized. In addition to computing simple runs of corresponding map ordinates (map addition), it was given the ability to do pair-wise subtractions,

multiplications, and divisions or to simply redisplay a map unmodified. Also, room was left for the user to define other pair-wise operations through either modifications to MULTIB or through the use of a special purpose subroutine MBPRØC.

With regard to the input of maps for combination, MULTIB was arranged so that it can receive its maps from either one tape or two tapes. In either case the input tapes may contain more than one map image - the user must merely identify which one or ones he wishes to be processed by indicating their sequential position numbers. This feature greatly facilitates the computation of nuclide ratio maps and similar displays since a single run of the Output Processor can place all of the needed "component" maps onto one multiple burst tape which might then be used by MULTIB to produce all desired combination maps in a single run.

<u>Details of the Operation of Program MULTIB</u>. The card inputs to MULTIB consist of (1) a run identifier card, (2) a control integer array card, and (3) a series of operation request cards. Table 2.2 summarizes the MULTIB and inputs. The first input card is merely for user convenience in identifying outputs. The second card contains an array of control integers which the user must use carefully. Their meanings are as follows:

TABLE 2.2 CARD INPUTS FOR PROGRAM MULTIB

Card Number	Content	Variable Names	Format
1	72 character run identifier	RUNID(12)	(12A6)
2	Control integer array	IC(18)	18I4
3	Request Card	C1,M1,NØP,M2,C2, NDIS	F10.3,3I5, F10.3,10X,I5
'	'	'	'
'	'	'	'
'		'	'
LAST	Termination card (Blank)		

IC(1) = 0 Generate a printed map only.
1 Generate a binary tape image only.
2 Generate both a printed map and a binary tape.

IC(2) = Logical identification numbers of the tape drive having the first multiple burst tape. If IC(2) is not set, the program will use logical 11.

IC(3) = Logical identification number of the tape drive having the second multiple burst tape. IC(3) set negative is used to indicate that only one multiple burst tape is to be used. If IC(3) is set to zero, the program will expect the second multiple burst tape on logical 11.

IC(4) = Logical identification number of a tape available as a scratch tape.

The third and subsequent cards are all the same form. Each of them (except the last) instructs MULTIB to carry out some processing task in which the parameters C1, M1, NØP, M2, C2, and NDIS are interpreted as follows:

C1 is a constant to be multiplied by each ordinate of the first map.

C2 is a constant to be multiplied by each ordinate of the second map.

M1 identifies the sequential position of the first map on the tape where it is stored.

NØP identifies the operation which is to be performed in accordance with the following code

NØP	Operation
0	Stop
1	Map addition
2	Map subtraction
3	Map multiplication
4	Map division
5	No operation - Display C1*M1
6-9	Not defined
10 up	Use special subroutine MBPRØC

M2 identifies the sequential position of the second map (if any) on the tape where it is stored.

NDIS is used to charge the value of the display control integer if it is desired to charge it in the midst of a set of processing requests. If NDIS is left blank (zero) no action occurs but if NDIS is not zero, IC(1) is set equal to NDIS - 1.

Next MULTIB sets map tape identifiers IN1 and IN2 and rewinds map tapes as appropriate. Then a request card is read and the exit condition test is performed. If NØP is less than one, the program transfers to statement 200 to exit. Otherwise, the request data are printed and then acted upon. IC(1) is reset to NDIS - 1 if NDIS was greater than zero. Then, on the basis of NØP, an assignment is given to NPRØC to bring about the desired kind of map processing.

Beginning at statement 310, the program makes arrangements to position the map tapes so that the desired maps may be combined. If the two maps to be combined are on separate tapes, these tapes are simply moved to the correct positions. If both maps are to come from the same tape, the physically first of the two desired maps is copied onto a scratch tape. The scratch tape is rewound and the map input tape is moved to the position of the second desired map on it. This is done with the subroutine SKIPP(N,M, ISØUT) which has the function of skipping over M map images on tape N. During the process of positioning t pes, the values of tape identification parameters IN1 and IN2 are changed so that IN1 will identify the tape with map number one (M1) on it and IN2 map number two (M2). Parameters INT1 and INT2 are used to restore the original state of IN1 and IN2 at the beginning of each subsequent pass.

After tapes are positioned, the program continues at statement 100 by reading and testing tape identifiers and map parameter records.

Actual map processing begins at statement 109 where a map strip title is read. At 110 a loop begins (to 108) that contains four subsections. The first of these reads one line of map images on tape. The second subsection is a loop to 105 which actually combines the two maps by use of parameter NPRØC to select the desired processing code. The end result of the processing of this map line is left in the array ØMAP.

The third section optionally writes the information in ØMAP onto a new binary tape identified by IØUT. The fourth and final section optionally prepares the map line array ØMAP for printing (in a two line E Format) and then prints it.

When the program finally exits the loop at 108, it is finished with a whole printer strip and goes back to 103 where it either begins on the next printer strip or recognizes the map termination condition (a zero line count on the input map). When such a termination is reached, a whole map has been finished and the program transfers to 3021 where preparations are made to start over again with a new processing request. As mentioned earlier, a final exit is made when the processing operation NØP ≤ 0 is encountered.

3. FILE UNITS

Provisions for storing the enormous volume of output generated by the DELFIC program are made by supplementing core memory with magnetic tape units, thus permitting the use of the overlay feature of the processor while preserving large quantities of computed results. The tape assignments of the DELFIC system are listed in Table 3.1. Three input file names are used in DELFIC: ISIN, INTP, and KRD. The mnemonic KRD is used in two ways: In the Cloud Rise Module it is always synonymous with ISIN; in the Particle Activity Module, KRD designates the file containing the soil composition. INTP is used in the Particle Activity Module to designate the file containing a set of invariant particle activity data. In the Particle Activity Module, a control parameter equates KRD to either ISIN or INTP. A second control parameter determines whether INTP = ISIN or INTP is unique. The output file name used in DELFIC is ISØUT which carries the mnemonic KTR in the Cloud Rise Module and KØUT in the Particle Activity Module.

It should be noted that the tapes designated as scratch tapes [1, 3, 4, 10, and IØT(J)] may be replaced by disc or drum units while the restart assignments (9 and 11) must be magnetic tape if the restart features are used. The current version of DELFIC may be restarted in one of the three locations listed in Table 3.2. The binary records of the three tapes listed in Table 3.2 are presented in Tables 3.3, 3.4, and 3.5. Table 3.6 lists the contents of the optional binary tape MBTAPE.

TABLE 3.1 DELFIC TAPE ASSIGNMENTS

Mnemonic	Mode	Assignment	Assignment Location
ISIN	BCD	By User (System Input Tape)	M3-36
ISØUT	BCD	6 (System Output Tape)	M3-39
IRISE	BINARY	9 (Restart)	M3-38
JPARIN	BINARY	10 (Scratch)	LINK4-331
IPARIN	BINARY	11 (Restart)	LINK4-332, LINK5-382
IØTØPØ	BINARY	4 (Scratch)	LINK5-383
IØWIND	BINARY	3 (Scratch)	LINK5-384
IHTØPØ	BINARY	10 (Optional)	LINK5-385
IPØUT*	BINARY	9 (Restart)	LINK5-386, LINK8-186
IPARØT	BINARY	1 (Scratch)	LINK5-387
MBTAPE	BINARY	11 (Optional)	LINK8-188
IØT(J)	BINARY	By User (Scratch)	Input to LINK8
INTP	BCD	By User (Input Data)	PAM1
KRD	BCD	By User (Input Data)	PAM1

*Carries the mnemonic IPAM in subroutine PAM1.

TABLE 3.2 DELFIC RESTART LOCATIONS

Location	Tape Required
LINK4	IRISE (LOGICAL 9)
LINK5	IPARIN (LOGICAL 11)
LINK8	IPØUT (LOGICAL 9)

TABLE 3.3 CONTENT OF BINARY TAPE IRISE

Record Number	Content	Write Statement WRITE (IRISE) List		Read Statement READ (IRISE) List	
1	Cloud Rise Module output tape identifier symbol, IRISE	DENT	RSXP 63	DENT	LNK4 341
2	Fission yield (kt), cloud soil burden, temperature of soil solidification, time of soil solidification, base e log of the geometric standard deviation of the (lognormal) particle diameter-volume frequency distribution, total yield (kt), height of burst above GZ (ft), base edge length of a basic cloud subdivision, fallout particle density, NSP = 1, maximum cloud radius, elevation of ground zero (ft)	FW,SSAM,SIDTMP,TMSD, SIGMA,TW,HØB,BZ, RØPART,NSP,CX(5,MCX), ZERSTZ	RSXP 67	FW,SSAM,SIDTMP, TMSD,SIGMA,TW,HØB,BZ, RØPART,NSP,RADMAX, ZERSTZ	LNK4 351
3	Cloud Rise Module run identification	(DNID(J),J=1,12)	RSXP 70	(CRID(J),J=1,12)	LNK4 354
4	Initial Conditions Module run identification	(DETID(J),J=1,12)	RSXP 71	(DETID(J),J=1,12)	LNK4 355
5	Number of particle size classes	NPS	RSXP 72	NPS	LNK4 356
6	Tables of central particle diameter (μ), volume (mass) fraction, lower boundary diameter (μ), and surface fraction to volume fraction ratio, for the particle size classes	(PS(J),FMASS(J), PACT(J),SV(J),J=1,NPS)	RSXP 76	(PS(I),A(I),PACT(I), SV(I),I=1,NPS)	LNK4 357
7	Number of altitude levels in the atmosphere tables	NAT	RSXP 77	NAT	LNK4 358
8	Atmosphere viscosity and density tables	(ETA(J),RHZ(J),J=1,NAT)	RSXP 78	(ATEMP(I),RHØ(I),I=1,NAT)	LNK4 359
9	Number of time entries in the cloud rise history tables, CX	NPØSIT	RSXP 79	NPØSIT	LNK4 360
10	Tables of cloud bottom height, top height, time, bottom velocity, and rise velocity	(CX(3,J),CX(4,J), CX(1,J),CX(6,J), CX(7,J),J=1,NPØSIT)	RSXP 85	(ZB(I),ZT(I),TC(I),VB(I), VT(I),I=1,NPØSIT)	LNK4 361
11	Block count of cloud subdivisions	LØDD	R XP 226	NP	LNK4 462
12	Block of cloud subdivision properties: x coordinate, y coordinate, altitude (above MSL), time, central particle size class diameter (μ), fallout mass per unit area of base	(GDPST(1,J),GDPST(2,J), GDPST(6,J),GDPST(3,J), GDPST(4,J),GDPST(5,J), J=1,LØDD)	RSX. 227	(XPAR(I),YPAR(I),ZPAR(I), TP(I),PSIZ(I),FMAS(I), I=1,NP)	LNK4 472
13	Block count	Same as record 11		Same as record 11	
14	Block count of cloud subdivision properties	Same as record 12		Same as record 12	
⋮	⋮	⋮		⋮	
N	Zero Block count to signal end of tape	LØDD	RSXP 237	Same as record 11	

TABLE 3.4 CONTENT OF BINARY TAPE IPARIN

Record Number	Content	Write Statement		Read Statement	
1	Tape identification word (IPARIN)	WRITE(IPARIN)DENTI	WINS 107	READ(IPARIN)DENTT	LNK5 459
2	Fission yield (kt), cloud soil burden, temperature of soil solidification, time of soil solidification, base e log of the geometric standard deviation of the (lognormal) particle diameter-volume frequency distribution, total yield (kt), height of burst above GZ (ft), NSP = 1, X, Y, and time coordinates of ground zero, base edge of a basic cloud subdivision, NCL = 0, maximum cloud radius	WRITE(IPARIN)FW,SSAM,SIDTMP, TMSD,SIGMA,TW,HØB,NSP,XGZ,YGZ, TGZ,BZ,NCL,RADMAX	WINS 111	READ(IPARIN)FW,SSAM,SIDTMP, TMSD,SIGMA,TW,HØB,NSP,XGZ, YGZ,TGZ,BZ,NCL,RADMAX	LNK5 465
3	LINK4 run identification	DØ 100 I = 1,3	WINS 113	READ(IPARIN)(PSEID(J), J=1,12)	LNK5 467
4	Cloud rise run identification	100 WRITE(IPARIN)(CRID(J),		READ(IPARIN)(CRID(J), J=1,12)	LNK5 468
5	Initial conditions run identification	J=1,12)		READ(IPARIN)(DETID(J), J=1,12)	LNK5 469
6	Particle density	WRITE(IPARIN)RØPART	WINS 122	READ(IPARIN)RØPART	LNK5 473
7	Number of particle size classes	WRITE(IPARIN)NPS	WINS 123	READ(IPARIN)NPS	LNK5 476
8	Tables of central particle dimater (μ), mass fraction, associated activity*, and surface-to-volume ratio for each size class	WRITE(IPARIN)(PS(J),A(J), PACT(J),SU(J),J=1,NPS)	WINS 124	READ(IPARIN)(PS(I),VY(I) VZ(I),VX(I),I=1,NPS)	LNK5 482
9	Number of altitude levels in the atmosphere tables	WRITE(IPARIN)N	WINS 125	READ(IPARIN)NA	LNK5 488
10	Atmosphere viscosity and density tables	WRITE(IPARIN)(ATEMP(J),RHØ(J), J=1,N)	WINS 126	READ(IPARIN)(ATEMP(J),RHØ(J), J=1,NA)	LNK5 489
11	Number of particles in the first data block	WRITE(IPARIN)N	WINS 204	READ(IPARIN)N	LIN7 112
12	Particle data: x coordinate, y coordinate, altitude (above MSL), time, central particle size class dimater (μ), fallout mass per unit area of base	WRITE(IPARIN)(XPAR(J),YPAR(J), ZPAR(J),TT(J),PSIZ(J),FMAS(J), J=1,N)	WINS 205	READ(IPARIN(XP(J),ZP(J), TP(J),PS(J),FMAS(J),J=1,IF)	LIN7 130
13	Same as Record 11 for the second data block	Same as Record 11		Same as Record 11	
14	Same as Record 12 for the second data block	Same as Record 12		Same as Record 12	
⋮	⋮	⋮		⋮	
M	Tape termination indicator	WRITE(IPARIN)N	WINS 149	Same as Record 11	

*No. yet calculated unless the user has provided a LINK3 particle activity calculation.

TABLE 3.5 CONTENT OF BINARY TAPE IPØUT

Record Number	Contents	Write Statement		Read Statement READ (IPØUT) List			
1	Identification word (IPØUT)	WRITE(IPØUT)PØUT	LNK5 516	PØUT	LINK8 197	TST	LINK9 155
2	Fission yield (kt), cloud soil burden, temperature of soil solidification, time of soil solidification, base e log of the geometric standard deviation of the (lognormal) particle diameter-volume frequency distribution total yield (kt), height of burst above GZ (ft), MCL = 0, time of transport termination, base edge length of a basic cloud subdivision, fallout particle density, X, Y, and time coordinates of ground zero, maximum cloud radius.	WRITE(IPØUT)FW,SSAM,SIDTMP,TMSD,SIGMA,TW,HØB,MCL,TLIMIT,HZ,RØPART,XGZ,YGZ,TGZ,RADMAX	LNK5 517	Same as WRITE	LINK8 205-6	TST,J=1,15	LINK9 156
3	Run identifiers for initial conditions, cloud rise, cloud rise-transport interface, transport, and wind field	WRITE(IPØUT)(DETID(J),J=1,12)(CRID(J),J=1,12),(PSEID(J),J=1,12),(TID(J),J=1,12),(WID(J),J=1,12)	LNK5 519	Same as WRITE	LINK8 214-5	5(DETID(J),J=1,12)	LINK9 157-8
4	Number of particle size classes	WRITE(IPØUT)NPS	LNK5 521	Same as WRITE	LINK8 216	NPS	LINK9 159
5	Central particle size class diameter, mass fraction, associated activity*, and surface-to-volume ratio for each size class	WRITE(IPØUT)(PSCJ),VY(J),VZ(J),VX(J),J=1,NPS)	LNK5 522	PSIZE(J),FMASS(J),PACT(J),SU,J=1,NPS	LINK8 217	TST,TST,TST,TST,J=1,NPS	LINK9 160
6	Topography identifier	WRITE(IPØUT)(BLANK,J=1,12) or WRITE(IPØUT)(TØPID(J),J=1,12)	LNK5 525 LNK5 527	TØPID(J),J=1,12	LINK8 219	DETID(J),J=1,12	LINK9 161
7	Number of particle descriptions in the following data block	WRITE(NTAP)JTEST	DUMP 412	NIJ	LINK8 269	NIJ	LETSGØ 59 RUN1 62
8	X coordinate, y coordinate, time, particle size, and mass associated with each particle	WRITE(NTAP)(XP(J),YP(J),TP(J),PS(J),FMAS(J),J=1,JTEST)	DUMP 414	X(I),Y(I),T(I),PS(I),FMAS(I),I=1,NIJ	LINK8 274	X(I),Y(I),T(I),PS(I),FMAS(I),I=1,NIJ	LETSGØ 78 RUN1 67
9	Same as Record 7	Same as Record 7					
10	Same as Record 8	Same as Record 8					
.	.	.					
N	The end of the grounded particles data set is indicated by a particle count of zero.	WRITE(IPØUT)NUL	LNK5 580				

TABLE 3.6 CONTENT OF BINARY TAPE MBTAPE

Record Number	Content	Write Satement Write (MBTAPE) List		Read Statement Read (INTI) List	
1	Identification word literal (MBTAPE)	BITIJM	MAPX 109	TSTI1	MULTIB 112
2	X coordinate of western edge of area of map 1, eastern edge, y coordinate of southern edge, northern edge, grid interval in x direction, grid interval in Y direction	XMIN,XMAX,YMIN,YMAX, DGX,DGY	MAPX 110	XMIN(1),XMAX(1), YMIN(1),YMAX(1), DGX(1),DGY(1)	MULTIB 114
3	Number of rows in first map strip, number of numbers in each map strip	NYMAP,KLINK	MAPX 209	NRØWS,NUMBERS	MULTIB 116
4,5,...,N_1+3	The N_1 rows of the first map strip	ØMAP(K),K=KL,KH	MAPX 254	ØMAP(K),K=1,NUMBRS	MULTIB 125
Next (N_2+1) records	Same as 3 thru N_1+3, but for the second map strip	Same as records 3 thru N_1+3		Same as records 3 thru N_1+3	
. . . .		. . . .		. . . .	
Next N records	Same as 3 thru N_1+3, but for the last map strip	Same as records 3 thru N_1+3		Same as records 3 thru N_1+3	
LAST	Number of rows = 0 Number of columns = 0	NUL,NUL	LINK9 119	NROWS, NUMBRS MULTIB	MULTIB 116

4. INPUT CARD DECKS

The card inputs to DELFIC cannot be described as an invariant sequence of rigidly defined data cards - the data sets going into a DELFIC run may vary in both extent and form depending upon which of the program options are being exercised. The user must arrange the data deck so that the data cards required by the programs and options that he is using are in the required sequence. The flow chart (Figure 4.1) has been prepared to aid the user in constructing a DELFIC input data deck for any given set of program options that he may desire to exercise. In that figure, each small-numbered square represents a set of data cards. The entire DELFIC data set consists of a given sequence of these "sub-decks" beginning with Deck Number 1 in the flow chart. The program options are included in the flow chart and the user should have no trouble in tracing out the correct sequence of decks to be used for any given set of options. A detailed description of each of the sub-decks appears on the pages following the flow chart. Table 4.1 immediately following the flow chart gives the number of the last sub-deck required by DELFIC for values of LTHRU $\neq$ 9.

TABLE 4.1 TERMINAL DECK NUMBERS FOR TRUNCATED DELFIC RUNS

LTHRU	Number of Last Data Deck
1	4 or 5
2	6
3,4	8
7	18
8	21 unless IFTAPE(4) = TRUE then 20.

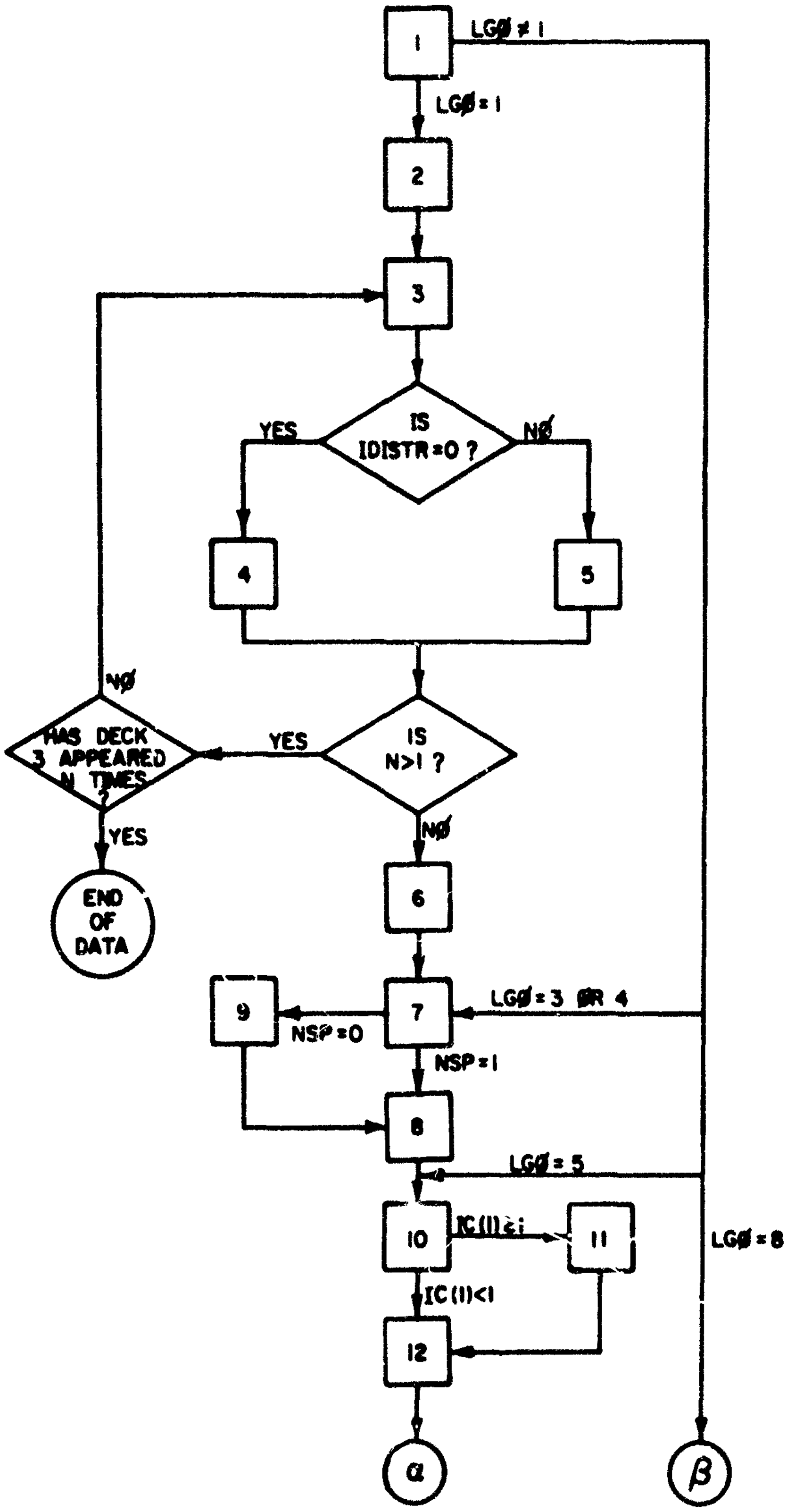

Figure 4.1 Card sequence for construction of a DELFIC input data deck.

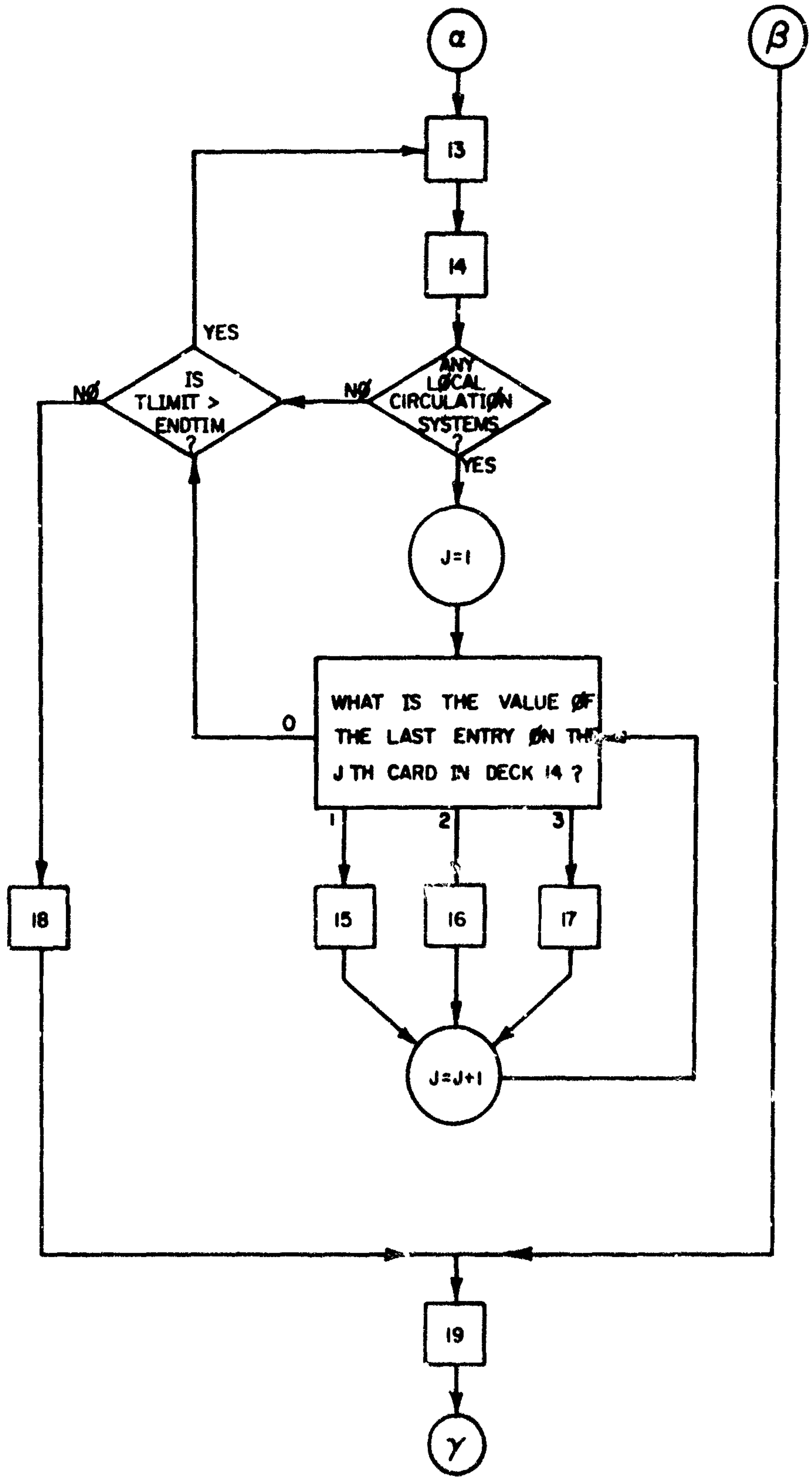

Figure 4.1 Continued.

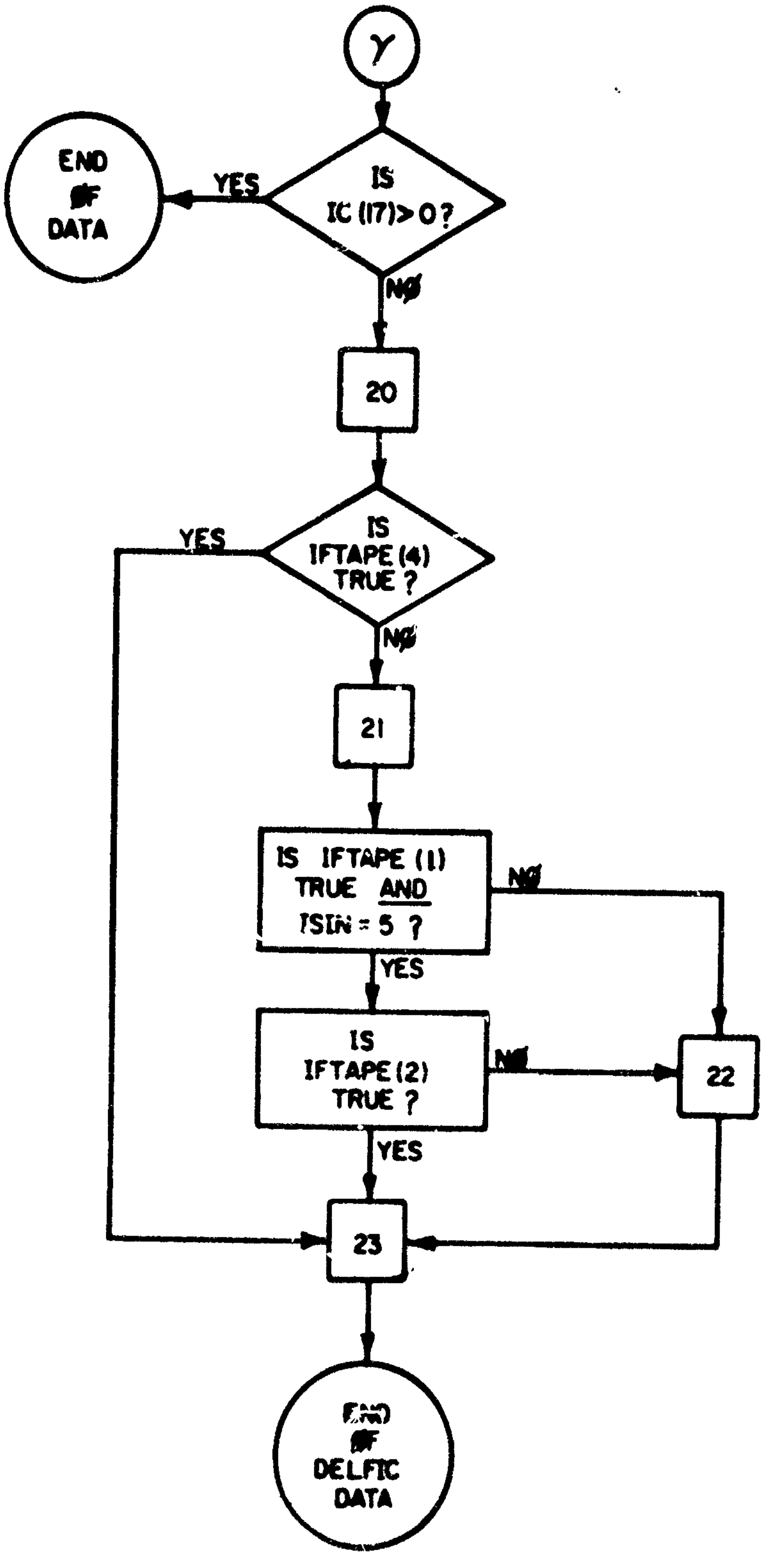

Figure 4.1 Continued.

$\boxed{1}$

Card Sequence	Mnemonic	Format
1	ISIN	(16X,I2)
2	LGØ,LTHRU	(12X,I2,6X,I2)

ISIN: The logical file number to be assigned to the utility input unit. This card must always be read on logical 5.

LGØ: The number of the LINK at which computations are to begin. In the current version of DELFIC, LGØ may be assigned to values 1,3,4,5, and 8.

LTHRU: The number of the LINK through which computations will proceed.

Deck 1 is read in the DELFIC executive program, M3.

$\boxed{2}$

Card Sequence	Mnemonic	Format
1	DETID(J), J=1,12	12A6
2	N	I5

DETID(J): Arbitrary 72-character identifier for the Initial Conditions Module. The 72-character sequence will appear in the printed output exactly as it appears on the input card.

N: The number of data sets for which initial conditions calculations are desired. If the value of N is zero or negative, a single data set will be expected and after computation of its initial conditions, a transfer will be made to LINK2.

Deck 2 is read by LINK1

$\boxed{3}$

Card Sequence	Mnemonic	Format
1	IDISTR	I5

IDISTR: Preshot soil size-frequency specification option parameter. A value of 0 selects the log-normal option whereas a value of 1 selects the tabular distribution option.

Deck 3 is read by LINK1.

$\boxed{4}$

Card Sequence	Mnemonic	Format
1	W,X,U,DIAM,SD	5F10.3
2	DMIN	F10.3

W: Total weapon yield in kilotons.

X: Height of burst in meters. For subsurface bursts, the depth of burst is entered as a negative number.

U: Soil type (1.0 indicates siliceous, 2.0 indicates calcareous).

DIAM: Mean diameter of the log-normal preshot particle size-number frequency distribution in microns.

SD: The standard deviation of the log-normal preshot particle size-number frequency distribution.

DMIN: Mid-range diameter of the smallest particle size class to be used in representing the log-normal distribution (microns).

Deck 4 is read by LINK1.

5

Card Sequence	Mnemonic	Format
1	W,X,U	3F10.3
2	DMIN	F10.3
3	NDSTR	I5
4,5,...	WHY(I), I=1,NDSTR	5F10.3

W: Total weapon yield in kilotons.

X: Height of burst in meters. For subsurface bursts, the depth of burst is entered as a negative number.

U: Soil type (1.0 indicates siliceous, 2.0 indicates calcareous).

DMIN: Mid-range diameter of the smallest particle size class to be used in the tabular representation of the particle size-mass frequency distribution.

NDSTR: Number of entries in the particle size-frequency table (NDSTR $\leq$ 40).

WHY(I): Particle size-mass frequency table with five entries per card. Each entry represents a mass fraction as discussed below.

The tabular distribution must be constructed and must be input to the program according to the following prescription. The table is constructed so that each successive mid-range diameter and boundary diameter is $\sqrt[3]{2}$ times its preceding diameter. Mid-range diameters are geometric means of the boundaries. In array WHY(I) the mass fraction for each size range is specified in sequence of increasing diameter. The parameter DMIN which is specified is defined as

$$DMIN = D_1/(2\sqrt[6]{2}) \quad \text{where } D_1 \text{ is the upper}$$

boundary diameter of the first size range.

Deck 5 is read by LINK1.

6

Card Sequence	Mnemonic	Format
1	DNID(J), J=1,12	12A6
2	NEQ,NTVL,KDI,IRAD, KCLD,KRX,KEQ,IPAM	8I4
3	ZBRSTZ	E12.5
4	SLDTMP	E12.5
5	FW	E12.5
6	ZTRP	E12.5
7	DNS	E12.5
8	ATID(J), J=1,12	12A6
9	FMT(J), J=1,12	12A6
10,11	SCALE(J), J=1,10	(7F10.5/3F10.5)
12	N1,N2,N3,N4,N5 N6,N7,N8	8I4
13	NPVA	I4
14,15,...	ALT(J), ATP(J), PRS(J), RHZ(J), RLH(J), ETA(J), GRV(J), SLM(J), J=1,NPVA	(FMT(I), I=1,12)

DNID(J): Arbitrary 72-character cloud-rise identification.

Control Data:

NEQ: This is the number of particle size classes to be used in the CRM calculations. Its maximum value is 40. If a tabular rather than a log-normal distribution has been provided by LINK1, the input value of NEQ is replaced by NDSTR (see Deck 5) before entrance to subroutine CRM. If a log-normal distribution is used, but NEQ is not specified, it is assigned a value of 40 in subroutine CPV.

NTVL: This is the number of particle size classes to be provided by subroutine GPSD for use by RSXP and subsequent DELFIC modules. Its maximum value is 200. If a tabular rather than log-normal distribution is provided by LINK1, the input value of NTVL is ignored. If a log-normal distribution is used, but NTVL is not specified, a value of 10 is assigned to it in subroutine GPSD.

KDI: This is the number of wafer subdivisions for each size class. It has no upper limit. If its input value is 0, it is calculated in subroutine DVD.

IRAD: This is the wafer radius division factor to be used in subdividing the cloud wafers into basic (square-based) cloud subdivisions. It has no upper limit. Careful attention should be given to this parameter. A large value can cause a very large amount of transport computer time to be required, while a value too small may result in a minimum subdivision size that is unrealistically large for stem subdivisions.

KCLD: This controls the CRM debug printout. A value of 0 suppresses the printout whereas a value of 1 results in a detailed printing of cloud and particle properties at intervals during the cloud-rise computations.

KRX: This controls the RSXP debug printouts. A value of 1 causes the printout whereas a value of 0 bypasses the printout option.

KEQ: A value of 0 suppresses the particle coalescence calculations. A value of 1 causes this option to be exercised.

IPAM: This parameter controls entrance to, or bypass of, subroutine PAM. In this version of DELFIC, PAM is a dummy subroutine and IPAM is always zero.

ZBRSTZ: Elevation of ground zero (meters above mean-sea-level).

SLDTMP: Soil solidification temperature (degrees Kelvin).

FW: Fission yield of weapon in kilotons.

ZTRP:	Altitude of tropopause (meters above mean-sea-level).
DNS:	Fallout particle density (g cm^{-3}).
ATID(J):	72-character atmosphere identifier.
FMT(J):	FORMAT for atmosphere data cards.
SCALE(J):	Atmosphere data scale - transformation parameters.
N1-N8:	Atmosphere data sequencing indices.
NPVA:	Number of altitude levels in the input atmosphere tables.
ALT(J):	Altitude above mean-sea-level.
ATP(J):	Temperature.
PRS(J):	Pressure.
RHZ(J):	Density.
RLH(J):	Relative humidity.
ETA(J):	Viscosity
GRV(J):	Acceleration of gravity
SLM(J):	Mean free path

The first eight cards of Deck 6 are read by subroutine ICRD and should require no further explanation. The balance of Deck 6 is read by subroutine ATMR. This subroutine has been written to provide the utmost flexibility regarding input of table of atmospheric properties. To provide this flexibility it is necessary to require a set of additional inputs that are somewhat complex. The user is cautioned to employ unusual care in the preparation of these inputs and to study carefully the tables of atmospheric properties printed out by subroutine ICRD to ensure that the quantities displayed are precisely thos required by the Cloud Rise Module calculations. The additional inputs referred to above are:

1. An object-time FORMAT for use in reading the atmosphere data cards (Card number 9).

2. A list of terms and factors to be used to transform the input data to the proper units (Cards 10 and 11).

3. A list of sequencing numbers that tells the program the order in which specific data quantities are punched across the input cards (Card number 12).

The lists of adjustment factors and sequencing numbers are closely related. First we discuss the sequencing numbers. There are eight sequence numbers punched on a card -- each of which is associated with a particular one of the eight atmospheric properties required by the program. This association is given in Table 4.2. The numbers punched in these fields range in value from 1 through 8. For a particular field, for example the density field, the number punched gives the actual read-in sequence number for density. That is, if a 3 is punched in the density field of the sequence card, this specifies that density will occupy the third field from the left (as defined by the object-time FORMAT card) on the data input card. Suppose our data input card has the following appearance:

Column Number	1	4	16	28	40
Numerical Content	10	225.171	0.41412 + 3		
Data Specified	Altitude	Temperature	Density	Relative Humidity	
Units	km	^{o}k	g/m^{3}	fractional	

A suitable FORMAT would be

(F4.0, 3E12.6, 4F1.1)

A suitable sequencing card would be:

Column Number	1	4	8	12	16	20	24	28	32
Sequence Number		1	2	5	3	4	6	7	8
Datum Represented		ALT	ATP	PRS	RHZ	RLH	ETA	GRV	SIM

Note that quantities not specified by input still must be provided for both in the FORMAT and on the sequence cards. Thus such quantities are read in as zero which indicates that they are to be supplied by the program.*

TABLE 4.2 CORRESPONDENCES OF SEQUENCE CARD FIELDS WITH ATMOSPHERE DATA

Field Number	Card Column Numbers	Datum Mnemonic	Datum Quantity	Units Required by the Calculations
1	1 - 4	ALT	altitude above M.S.L.	m
2	5 - 8	ATP	temperature	^{o}K
3	9 - 12	PRS	pressure	mb
4	13 - 16	RHZ	density	g cm^{-3}
5	17 - 20	RLH	relative humidity	%
6	21 - 24	ETA	viscosity	g (cm s^{-1})
7	25 - 28	GRV	acceleration of gravity	cm s^{-2}
8	29 - 32	SIM	mean-free-path	cm

*The program must have altitude, temperature, relative humidity, and either density or pressure. Though not required, any or all of the other quantities can be supplied, in which case they are not calculated by the program.

As with the sequencing numbers, the fields on the scale cards (two scale cards are input) always correspond to specific data quantities. The numbers punched in the scale cards are used to transform the input data to the units specified in Table 4.2. The transformations are performed as follows:

```
ALT(I) = (ALT(I) + SCALE (1) ) * SCALE (3)
ATP(I) = (ATP(I) + SCALE (2) ) * SCALE (4)
PRS(I) + PRS (I) * SCALE (5)
RHZ(I) + RHZ (I) * SCALE (6)
RLH(I) = RLH (I) * SCALE (7)
ETA(I) = ETA (I) * SCALE (8)
GRV(I) = GRV (I) * SCALE (9)
SIM(I) = SIM (I) * SCALE (10)
```

SCALE array entries 3 through 10 are replaced with 1.0 if they are read in as zero. If no transformations are required, blank cards can be used for the scale cards.

For the input data example shown on page 45, the following scale cards would be required:

Card 1

Column Numbers	1	10	20	30	40	50	60	70
Content			1000		66	1.0-6	100	

Card 2

blank

The atmosphere data cards themselves must conform to the object-time FORMAT specified by the user and they must be ordered in sequence of increasing altitude. The altitude increments between cards is arbitrary, however, and there are no restrictions on the specific altitudes supplied by input other than that they should lie in the range of 1,000 to 50,000 meters above mean sea level. The program automatically will build tables of 256 entries each of atmospheric properties in the range of altitude from 1,000 through 50,000 meters (relative to mean sea level) at intervals of 200 meters.

Card sequences 1 through 8 are read by ICRD. The remainder of Deck 6 is read by ATMR.

$\boxed{7}$

Card Sequence	Mnemonic	Format
1	PSEID(J), J=1,12	12A6
2	IC(J), J=1,18	18I4
3	XGZ,YGZ,TGZ	3E13.6

PSEID(J): Arbitrary 72-character identifier for the cloud-rise transport-interface module.

IC(J): Control indices. In the current version of DELFIC, only one of the 18 elements of this control array is in use. This is IC(3). If IC(3) = 0, the complete particle output will appear on the system output tape as well as tapes JPARIN and IPARIN. If IC(3) >0, only tapes JPARIN and IPARIN will be written. As the CRTI program output is voluminous, we suggest setting IC(3) > 0 to save computation time.

XGZ: X coordinate of ground zero (meters)

YGZ: Y coordinate of ground zero (meters)

TGZ: detonation time (seconds)

Deck 7 is read by LINK4.

$\boxed{8}$

Card Sequence	Mnemonic	Format
1	NHØDØ	I5
2,3,...	ZV(J),VX(J),VY(J), J=1,NHØDØ	3E13.6

NHØDØ: Number of altitude strata in the wind hodograph.

ZV(J): Altitude of the center of Jth wind hodograph stratum (meters)

VX(J): X component of wind in Jth stratum (meters/second)

VY(J): Y component of wind in Jth stratum (meters/second)

Deck 8 is read by LINK4.

$\boxed{9}$

Card Sequence	Mnemonic	Format
1	MPS,VI,H,COL,COLS	(I5,4E13.6)
2	ROW,ROWS,COLX,B	4E13.6

See pages 3-24, DASA-1800-III, for details of Card Deck 9.

In the current version of DELFIC, NSP = 1 is set at RSXP 46 which exercises option A. To exercise option B, the user must supply a new cloud-rise module which sets NSP = 0 and provides the additional input needed by the CRTIM.

Deck 9 is read by LINK4.

10

Card Sequence	Mnemonic	Format
1	TID(J),J=1,12	12A6
2	IC(J),J=1,18	18I4
3	TLIMIT	F12.3

TID(J): Arbitrary 72-character identifiers for the Transport Module.

IC(J): Transport Control Array. Only 8 of the 18 elements of the array IC have been given functions at this time and their uses are summarized below.

J	Function
1	> 0 suppresses usage of topography tape, IHTØPØ, and a planar topography is assumed.
2	> 0 suppresses usage of off-topo secondary tape, IØTØPØ.
3	> 0 suppresses usage of out-of-wind-field secondary tape, IØWIND.
4	> 0 suppresses usage of time-boundary secondary tape, IPARØT.
5	> 0 suppresses usage of all secondary tapes.
6	< 1, no transport traces are printed. = 1, in-core particle arrays are printed following read-in of each block of particles from IPARIN. > 1, in addition, a print-out is executed following each transport increment.
7	= 1, causes the computed wind field to be printed each time it is updated.
8	= 0, causes a listing of lost particles whenever a group of lost particles are discarded by subroutine DUMPP.

TLIMIT: Transport time limit, seconds.

Deck 10 is read by LINK5.

11

Card Sequence	Mnemonic	Format
1	TTØPØ	F10.5

TTØPØ: Altitude of planar topography, meters.

Deck 11 is read by LINK5.

12

Card Sequence	Mnemonic	Format
1	WID(J), J=1,12	12A6

WID(J): Wind-field data set identifier.

Deck 12 is read by LINK5.

13

Card Sequence	Mnemonic	Format
1	ENDTIM,ALPHA,BETA	3F10.3
2	NN,NCODE	2I4
3	BOTHIT(J),WGRINT(J),WLLX(J), WLLY(J),WURX(J),WURY(J), J = 1	6F10.3
4	Same as card 3 but for J = 2	
.	.	
.	.	
.	.	

Last of Sub-division Specifications	The end of the subdivision specifications is marked by the number 999999.0	F10.3
First Data Vector	ZS(J),XS(J),YS(J),SX(J),SY(J), SZ(J), J = 1	6F12.3
Second Data Vector	Same as first data vector but for J = 2	
.	.	
.	.	
.	.	
.	.	
Last Vector	The end of the data vectors is marked by the number 999999.0	F12.3

ENDTIM: Time at which the forthcoming wind data set is to be updated, seconds.

ALPHA,BETA: See page 12, DASA 1800-IV.

NN: The number of nearest data vectors that the user wishes the program to use in making a vector estimate for each grid point.

NCØDE: The identification number of the computation method to be used in making grid point vector estimates.

NCØDE Value	Method
1	Use preferential weighting method with the nearest NN data vectors.
2	Set NN = 1 and use code number 1.
3	Set NN equal to the total number of data vectors available and use code number 1.
4	Use the least-squares method to fit a linear model of the atmosphere. In this case NN must be greater than 3.

BØTHIT(J): Altitude of the Jth stratum base, meters above mean sea level.

WGRINT(J): Width of wind cells in the Jth stratum, meters

WLLX(J): Coordinate of plane limiting the Jth stratum on the west.

WLLY(J): Same as above but on the south.

WURX(J): Same as above but on the east.

WURY(J): Same as above but on the north.

ZS(J): Vector altitude, meters.

XS(J): X coordinate, meters.

YS(J): Y coordinate, meters.

SX(J): X-velocity component, meters/second

SY(J): Y-velocity component, meters/second

SZ(J): Z-velocity component, meters/second

A west wind (from the west) has a positive X component; a south wind has a positive Y component; the Z direction is positive upward.

Deck 13 is read by subroutine MKWIND.

14

Card Sequence	Mnemonic	Format
1	CRMINX(J), CRMAXX(J), CRMINY(J), CRMAXY(J), NCRTYP(J), J = 1	(4E12.5,I3)
2	Same as card 1 but for J = 2	
.	.	
.	.	
.	.	
Last Card	Blank	

CRMINX(J): Coordinate of plane that bounds the Jth local circulation system cell on the west.

CRMAXX(J): Same as above but on the east.

CRMINY(J): Same as above but on the south.

CRMAXY(J): Same as above but on the north.

NCRTYP(J): Circulation type identifier for the Jth local circulation cell. The values currently in use are:

1 - Mountain Wind
2 - Ridge Wind
3 - Sea Breeze

Deck 14 is read by subroutine RDCIRS.

$\boxed{15}$

Card Sequence	Mnemonic	Format
1	SM(J),YM(J),H(J),A(J) J=1	4F10.3
2	Same as card 1 but for J=2, the second mountain.	
.	.	
.	.	
.	.	
Last Card	Blank	

XM(J): X coordinate of the Jth mountain, meters.

YM(J): Y coordinate of the Jth mountain, meters.

H(J): Maximum height of the Jth mountain, meters.

A(J): Half width of the Jth mountain, meters.

Deck 15 is read by subroutine MTWND1.

$\boxed{16}$

Card Sequence	Mnemonic	Format
1	SM(J),YM(J),H(J),A(J),B(J) J = 1	5F10.
2	Same as Card 1 but for J = 2, the second ridge	
.	.	
.	.	
.	.	
Last Card	Blank	

XM(J): X coordinate of a point on the Jth ridge line, meters

YM(J): Y coordinate of a point on the Jth ridge line, meters

H(J): Height of the Jth ridge, meters

A(J): Half width of the Jth ridge, meters

B(J): Orientation angle of the Jth ridge, radians clockwise from time north.

Deck 16 is read by subroutine RGWND1.

17

Card Sequence	Mnemonic	Format
1	SNPHI, SGMA, ELX, THET	4F10.3
2	WW,AKY,B,GRAD,NN	(4F10.3,I10)
3	DELTX(N),TAUX(N),N=1	2F10.3
4	Same as Card 3 but for N = 2.	
.	.	
.	.	
.	.	
Last card	Same as Card 3 but for N = NN.	

SNPHI: Sine of the latitude of the sea-breeze cell.

SGMA: Guldberg - Mohn friction parameter.

ELX: The total extent of the sea-breeze

THET: Average ground temperature

WW: Wind-field extrapolation attenuation constant.

AKY:	Thermal eddy diffusivity.
B:	Coastline orientation angle.
GRAD:	Unperturbed temperature gradient.
NN:	Number of harmonics used in temperature-time description.
DELTX(N):	Magnitude of the Nth temperature differential.
TAUX(N):	Phase of the Nth temperature differential.

Deck 17 is read by subroutine CBREZ1.

18

Card Sequence	Mnemonic	Format
1	RTST	12A6

RTST: This card signals the end of the wind field data and is punched, beginning in column 1, as

END ØF WIND FIELD

Deck 18 is read by LINK5.

19

Card Sequence	Mnemonic	Format
1	ØPID(J),J=1,12	12A6
2	IØT(J),J=1,18	18I4
3	IC(J),J=1,18	18I4
4	DIFCØN	F10.3
5	IH,IV	2I4

ØPID(J): Artitrary 72-character output processor identifier.

IØT(J): List of logical tape numbers of those tape units available for use in sorting.

IC(J): Overall control variables. Currently, only IC(17) and IC(18) have been given functions.

IC(17): Controls entrance to the Output Processor. IC(17) > 0 causes the program to stop without entering the Output Processor proper. This setting is used if only a printing of the grounded particles tape is desired. IC(17) = 0 causes a normal entrance to the main body of the Output Processor regardless of whether the grounded particles tape has been printed.

IC(18): Controls the option to print the content of the grounded particles tape. IC(18) > 0 causes the grounded particles tape to be printed. IC(18) = 0 bypasses the printing of the grounded particles tape.

DIFCØN: Diffusion constant.

IH,IV: Horizontal and vertical character spacings of the printer in characters per inch. For the usual IBM printer, 10 and 6 are the appropriate values for IH and IV.

Deck 19 is read by LINK8.

20

Card Sequence	Mnemonic	Format
1	PAMID(J), J=1,12	12A6
2	IFTAPE(J), J=1,10	10L1
3	NPRNT(J), J=1,15	15L1

PAMID(J): Arbitrary 72-character particle activity module identifier.

IFTAPE(J): File control parameters.

IFTAPE(1): If FALSE, INTP = ISIN.
If TRUE and ISIN = 5,INTP = 12.
If TRUE and ISIN ≠ 5,INTP = 5.

IFTAPE(2): If FALSE, KRD = ISIN
If TRUE, KRAD = INTP

IFTAPE(3): If TRUE, write PAM restart information as a trailer on the grounded particles file (logical 9). Be sure 9 has ring in.

IFTAPE(4): If TRUE, the PAM expects restart information on logical 9.

NPRNT(J): Printout Control Parameters. See glossary at the beginning of subroutine PAM1.

Deck 20 is read by subroutine PAM1.

21

Card Sequence	Mnemonic	Format
1	CAPFIS, EMITN	2F10.3
2	FISSID	A6

CAPFIS: Capture-to-fission ratio.

EMITN: Number of neutrons emitted per fission.

FISSID: Type of fission (See DASA-1800-V).

Deck 21 is read by subroutine PAM 1.

22

Card Sequence	Mnemonic	Format

This option allows the invariant PAM data (on distributed Reel B) to be read into the program on cards. For a detailed description of the data deck required for this option see DASA-1800-V.

23

	Card Sequence	Mnemonic	Format
First "Local" Data Set	1	XMAX, XMIN, YMAX, YMIN, DGX, DGY, GRUFF	7F10.3
	2	JC(J), J=1,18	18I4
	3	NREQ, T1, T2, MASCHN	(I4,2F10.3,I4)
	4	Same as Card 3 but for second request	
	.	.	
	.	.	
	.	.	
	Request Termination Card	Blank	

Next "Local" Data Set	Same sequence as First Local Data Set
.	.
.	.
.	.
Final Data Card	Blank

XMAX, XMIN,
XMAX, YMIN: Limiting coordinates of the map, meters.

DGX, DGY: Map grid intervals, meters

GRUFF: Ground roughness correlation factor.

JC(J): Local control variables:

The following options are currently in use.

JC(1): A value of 1 results in the printing of the output map in a two-line E format which has the power of ten printed on one line and the associated multiplier printed immediately below.

A value of 2 results in the printing of a two-line F11.3 format which has the six highest order characters printed on the first line and the five lowest characters on the second line.

A value of 3 causes the Output Processor to write a map image onto the multiple burst tape (the unit identified in parameter MBTAPE as logical 11). When using the multiple burst option, care should be taken to see that the tape unit defined by parameter MBTAPE is not also specified as being available for use during the sorting operations of the Output Processor.

JC(14): This parameter must be set non-zero to obtain output maps. If the parameter is set equal to zero, only printout tables from the PAM are obtained.

JC(15): A value of 0 bypasses the diffusion model. A value greater than zero brings about the use of the diffusion subroutine DIFUZ1.

JC(16): A value of 0 results in the automatic adjustment of the grid interval DGX or DGY to yield an undistorted output map. A non-zero value results in no adjustment to the grid intervals.

JC(18): A value of 0 indicates the user's permission for the program to make a small adjustment to the grid intervals to achieve greater program efficiency. A positive value indicates the user's wish to have no adjustment made to the grid intervals. JC(18) > 0 overrides JC(16) = 0, i.e., for an automatic undistorted map, JC(18) and JC(16) must both equal zero.

NREQ: Computation Code Request.

NREQ	Description
0	Termination of the set of requests.
1	Count of wafers covering each output point.
2	Exposure rate normalized to H+1 hour.
3	Exposure rate at H+T1 hours.
4	Integrated exposure, H+T1 to ∞ accounting for time of arrival.
5	Integrated exposure, H+T1 to H+T2 accounting for time of arrival.
6	Total mass deposited.
7	Total mass deposited from time H+T1 to H+T2.
8	Integrated exposure, H+T1 to H+T2 assuming all particles have arrived by H+T1 hours.

9	Same as 8 integrated to infinity.
10	Concentration of an individual mass chain in curies/m^2 if T1 > 0, equivalent fissions/m^2 if T1 = 0.
11	Time of arrival of first fallout particle.
12	Time of deposit of last fallout particle.
13	Smallest particle size deposited.
14	Largest particle size deposited.
15	Mass from particles in size range T1 to T2.
16	H+1 hour "normalized" exposure rate resulting from particles in size range T1 to T2 microns.
T1,T2:	Arguments used in conjunction with NREQ.
MASCHN:	Mass chain number if the output is to be for a single mass chain. Otherwise, its field may be left blank.

Deck 23 is read by LINK9.

5. FORTRAN LISTINGS

5.1 DELFIC

```
$IBFTC M3      LIST,DECK,M94/2
C      15 FEB 67
C      T. W. SCHWENKE
C      MAIN CONTROL PROGRAM OF THE DOD FALLOUT PREDICTION SYSTEM
C      THIRD VERSION  --  INCLUDES ROUTING CONTROL AND ON-LINE PRINTING
C      READS IN LOGICAL NUMBER FOR DATA INPUT TAPE
C
C *********************************************************************
C
       COMMON /SET1/
     1          DIAM    , FID(12), IRISE   , IEXEC   , ISIN    , ISOUT    ,
     2          SD      , SPAR    , SSAM    , TME     , TMP1    , TMP2     ,
     3          T2M     , U       , VPR     , W       , X       , Z        ,
     4          WHY(40), NUSTR   , IDISTR  , SPAR1   , SPAR2   , SPAR3    ,
     5          SPAR4   , RMIN    , SPAR6   , SPAR7   , SPAR8   , SPAR9
C
C *********************************************************************
C
C      IEXEC             EXECUTIVE CONTROL WORD TO CONTROL BRANCHING
C                        BETWEEN CHAIN LINK SUBROUTINES
C      ISIN              SYSTEM INPUT TAPE NUMBER
C      ISOUT             SYSTEM OUTPUT TAPE NUMBER
C
C *********************************************************************
C
 1     FORMAT(14H ENTERING LINK,I2)
 2     FORMAT(12X,I2,6X,I2)
 3     FORMAT(/10X,14HUSING MODULES I2,6H THRU I2)
 4     FORMAT(/10X16HISIN IS LOGICAL I2/)
 5     FORMAT (16X,I2)
C
C *********************************************************************
C *********************************************************************
C
C      READ THE NUMBER OF THE TAPE UNIT FROM WHICH THE REST OF THE
C      VARIANT DELFIC DATA ARE TO BE READ
       READ (5,5) ISIN
C
       IRISE=9
       ISOUT=6
       WRITE (ISOUT,4) ISIN
C
C      READ ROUTING INSTRUCTIONS
       READ(ISIN,2)LGO,LTHRU
       IF(LGO.EQ.0) LGO=1
       IF(LGO.GT.9) LGO=9
       IF(LTHRU.EQ.0) LTHRU=9
       IF(LTHRU.GT.9) LTHRU=9
       WRITE(ISOUT,3) LGO,LTHRU
       PRINT 3,   LGO,LTHRU
       GO TO (101,102,103,104,105,106,107,108,109),LGO
 101   LNK=1
       WRITE (ISOUT,1)LNK
       PRINT 1,LNK
       CALL LINK1
 102   LNK=2
       IF(LNK.GT.LTHRU) GO TO 150
       WRITE (ISOUT,1)LNK
       PRINT 1,LNK
       CALL LINK2
```

```
 103  LNK=3
      IF(LNK.GT.LTHRU) GO TO 150
      WRITE (ISOUT,1)LNK
      PRINT 1,LNK
      CALL LINK3
 104  LNK=4
      IF(LNK.GT.LTHRU) GO TO 150
      WRITE (ISOUT,1)LNK
      PRINT 1,LNK
      CALL LINK4
 105  LNK=5
      IF(LNK.GT.LTHRU) GO TO 150
      WRITE (ISOUT,1)LNK
      PRINT 1,LNK
      CALL LINK5
C
C     IS TRANSPORT COMPLETED.        YES TO 107.   NO TO 106.
      IF(IEXEC-1)106,106,108
 106  LNK=6
      IF(LNK.GT.LTHRU) GO TO 150
      WRITE (ISOUT,1)LNK
      PRINT 1,LNK
      CALL LINK6
 107  LNK=7
      IF(LNK.GT.LTHRU) GO TO 150
      WRITE (ISOUT,1)LNK
      PRINT 1,LNK
      CALL LINK7
      GO TO 105
 108  LNK=8
      IF(LNK.GT.LTHRU) GO TO 150
      WRITE (ISOUT,1)LNK
      PRINT 1,LNK
      CALL LINK8
 109  LNK=9
      IF(LNK.GT.LTHRU) GO TO 150
      WRITE (ISOUT,1)LNK
      PRINT 1,LNK
      CALL LINK9
 150  STOP
      END
$IBFTC ERRORX  LIST,DECK,M94/2
      SUBROUTINE ERROR (PROGRM,IRROR,ISOUT)
C     T. W. SCHWENKE  TECHNICAL OPERATIONS RESEARCH
C     1 MARCH 1966
C
C ********************************************************************
C
C     THIS PROGRAM WRITES A GENERALIZED ERROR COMMENT OF THE FOLLOWING
C     FORM ON TAPE ISOUT AND THEN RETURNS IF THE SIGN OF IRROR IS
C     POSITIVE OR STOPS IF ITS SIGN IS NEGATIVE.
C
C         ERROR SENSED IN PROGRAM (PROGRM) AT OR NEAR STATEMENT NUMBER
C         (IRROR).  PLEASE REFER TO THE PROGRAM LISTING.
C
C     PRIOR TO CALLING ERROR  THE PARAMETER  PROGRM  MUST BE SET
C                                WITH THE BCD NAME OF THE CALLING
C     PROGRAM AND PARAMETER  IRROR  MUST BE SET WITH THE NUMBER OF THE
C     FORTRAN STATEMENT WHICH BEST IDENTIFIES THE ERROR CONDITION.
C
```

```
C ***********************************************************************ERRS0200
C                                                                        ERRS0210
 1    FORMAT(//26H ERROR SENSED IN PROGRAM  A6,30H  AT OR NEAR STATEMENTERRS0220
    1 NUMBER I6,40H .  PLEASE REFER TO THE PROGRAM LISTING.)             ERRS0230
C                                                                        ERRS0240
C ***********************************************************************ERRS0250
C **********************************************************************
C                                                                        ERRS0260
      IRR= IABS(IRROR)
      WRITE (ISOUT,1)PROGRM,IRR
      IF(IRROR)101,100,100
  100 RETURN
  101 STOP
      END                                                                ERRS0290
$IBMAP TAP09    5
       ENTRY    .UN09.
.UN09. PZE      TAPE09
TAPE09 FILE     ,A(1),MOUNT,BIN,BLK=256,INOUT,HOLD
       END
$IBMAP TAP10    5
       ENTRY    .UN10.
.UN10. PZE      TAPE10
TAPE10 FILE     ,B(1),MOUNT,BIN,BLK=256,INOUT,HOLD
       END
$IBMAP TAP11    5
       ENTRY    .UN11.
.UN11. PZE      TAPE11
TAPE11 FILE     ,A(2),MOUNT,BIN,BLK=256,INOUT,HOLD
       END
$IBMAP TAP12    5
       ENTRY    .UN12.
.UN12. PZE      TAPE12
TAPE12 FILE     ,B(2),MOUNT,BCD,BLK=14, INOUT,HOLD
       END
TAPE12 FILE     ,B(2),MOUNT,BCD,BLK=14, INOUT,HOLD
$IBFTC FALRA    LIST,DECK,M94/2                                          FALR   0
C     SUBROUTINE FALRAT                                                  FALR   1
C     W.T.G.ING           TECHNICAL OPERATIONS RESEARCH                  FALR   2
C     DEC  14 1965                                                       FALR   3
      SUBROUTINE  FALRAT(ALT,PSIZE,FV,ATEMP,RHO,FROG,ISOUT)              FALR   4
C                                                                        FALR   5
C***********************************************************************FALR   6
C                                                                        FALR   7
C     SUBROUTINE FALRAT,USING DAVIE*S EQUATIONS, COMPUTES THE SETTLING   FALR   8
C     RATE OF PARTICLES BY USING PARTICLE DIAMETER (MICRONS), ALTITUDE   FALR   9
C     (METERS ABOVE MSL) AND A STANDARD ATMOSPHERE FOR WHICH THE DENSITYFALR  10
C     AND VISCOSITY HAVE BEEN TABULATED IN ARRAYS RHO(I) AND ATEMP(I)    FALR  11
C     RESPECTIVELY.                                                      FALR  12
C                                                                        FALR  13
C***********************************************************************FALR  14
C                                                                        FALR  15
      DIMENSION ATEMP(260),RHO(260)                                      FALR  16
      REAL LOG10                                                         FALR  17
C                                                                        FALR  18
C***********************     FALRAT GLOSSARY     ***********************FALR  19
C                                                                        FALR  20
C     ALT            HEIGHT OF THE PARTICLE ABOVE MSL   (METERS)         FALR  21
C     ATEMP(I)       DYNAMIC VISCOSITY OF AIR AT ((I-1)*200) METERS ABOVE FALR  22
C                    MSL.              (KILOGRAM/METER-SECOND)           FALR  23
C     CDRR           THE DRAG COEFFICIENT * SQUARE OF THE REYNOLD-S      FALR  24
```

```
C                     NUMBER.                                           FALR  25
C      FROG           (4/3)*PARTICLE DENSITY*GRAVITY*(CUBIC METERS/ CUBIC  FALR  26
C                     MICRON).  KILOGRAM-METER/((SQR. SEC.)*(CUBIC MICRON))FALP  27
C      FV             SETTLING RATE    (METERS/SEC)                     FALR  28
C      PSIZE          PARTICLE DIAMETER    (MICRONS)                    FALR  29
C      RHO(J)         ATM DENSITY AT (I-1)*200 METERS  ABOVE MSL.  (KILO-  FALR  30
C                     GRAMS/ CUBIC METER)                               FALR  31
C                                                                       FALR  32
C***********************************************************************FALR  33
C                                                                       FALR  34
 2    FORMAT(//38H DAVIES EQUATIONS ARE INACCURATE FOR  ,F12.3,12H MICROFALR  35
     1NS AT ,F12.3,7H METERS)                                           FALR  36
C                                                                       FALR  37
C **********************************************************************FALR  38
C **********************************************************************FALR  39
C                                                                       FALR  40
C     I IS THE INDEX (IN THE ARRAYS RHO(I) AND ATEMP(I)) THAT IDENTIFIESFALR  41
C     THE 200    ER THICK LAYER CONTAINING THE PARTICLE.  THE ADDITION  FALR  42
C     OF 6.5 TO THE INDEX BEFORE TRUNCATION INSURES THAT PARTICLES      FALR  43
C     BETWEEN -     AND +    METERS ABOVE MSL WILL LIE IN THE SIXTH LAYERFALR  44
C     WHICH HAS I            LOCATED AT MSL. PARTICLES BETWEEN 100 AND 300FALR  45
C     METERS ABOVE MSL WILL LIE IN THE  7-TH  LAYER WHICH HAS ITS CENTERFALR  46
C     LOCATED AT 200 METERS ABOVE MSL, AND SO FORTH.                    FALR  47
      I=(ALT/200.0)+6.5                                                 FALR  48
      V0=PSIZE/ATEMP(I)                                                 FALR  49
      V1=PSIZE*V0*FROG                                                  FALR  50
      CDRR=V1*RHO(I)*V0                                                 FALR  51
      IF(CDRR-140.0)100,100,150                                         FALR  52
 150  IF (CDRR-4.5E+7)200,151,151                                       FALR  53
C151  CDRR EXCEEDS THE UPPER RANGE OF DAVIE*S EQUATIONS.  HOWEVER, THE  FALR  54
C     NUMERICAL RESULT IS STILL USED.                                   FALR  55
 151  WRITE (ISOUT,2)PSIZE,ALT                                          FALR  56
      GO TO 200                                                         FALR  57
C100  CDRR IS LESS THAN OR EQUAL TO 140.                                FALR  58
 100  FV=V1*(41666.7 +CDRR*(-2.3363E+2+CDRR*(2.0154   -6.9105E-3*CDRR)))FALR  59
      GO TO 300                                                         FALR  60
C200  CDRR IS GREATER THAN 140.                                         FALR  61
 200  QLOGA=ALOG10(CDRR)-20.773                                         FALR  62
      FV=50657.0 *V1*CDRR**((QLOGA*QLOGA-443.98)*0.0011235)             FALR  63
C300  DRAG SLIP CORRECTED FALL RATE                                     FALR  64
 300  FV=FV*(1.0+2.33E-1/(PSIZE*RHO(I)))                                FALR  65
 301  RETURN                                                            FALR  66
      END                                                               FALR  67
 301  RETURN                                                            FALR  66
$IBFTC LNK1    LIST,DECK,M94/2                                          LNK1   0
      SUBROUTINE LINK1                                                  LNK1   1
C     INITIAL CONDITIONS (FIREBALL) MODULE                              LNK1   2
C     TECHNICAL OPERATIONS RESEARCH    22 SEPT 1966                     LNK1   3
C                                                                       LNK1   4
C **********************************************************************LNK1   5
C                                                                       LNK1   6
C     PROGRAM TO DETERMINE THE INITIAL CONDITIONS SPECIFICATIONS OF     LNK1   7
C     TIME, TEMPERATURE, TOTAL SOIL MASS, FRACTION OF THE SOIL BURDEN INLNK1   8
C     THE VAPOR PHASE, AND THE SIZE FREQUENCY DISTRIBUTION OF THE       LNK1   9
C     CONDENSED PHASE SOIL                                              LNK1  10
C                                                                       LNK1  11
C     THE FIRST CARD CONTAINS ANY ARBITRARY ALPHANUMERIC IDENTIFICATION.LNK1  12
C     THE SECOND CARD OF THE DATA DECK CONTAINS THE NUMBER OF CASES TO  LNK1  13
C     BE RUN, FORMAT (I5).                                              LNK1  14
C     THIS PARAMETER SHOULD BE LEFT BLANK IF THE USER WISHES THE PROGRAMLNK1  15
```

```
C     TO CALL LINK2 AND SHOULD BE GIVEN SOME POSITIVE VALUE N IF
C     THE USER WISHES THE PROGRAM TO STOP AFTER COMPUTING N SETS OF
C     INITIAL CONDITIONS.
C
C     OTHER INPUT PARAMETERS ARE - TEST PARAMETER (IDISTR) TO DETERMINE
C     IF THE PARTICLE SIZE FREQUENCY DISTRIBUTION IS LOG-NORMAL OR
C     TABULAR, YIELD IN KILOTONS, HEIGHT (DEPTH) OF BURST IN METERS,
C     A SOIL TYPE INDICATOR, DIAMETER OF THE SMALLEST PARTICLE SIZE
C     (MICRONS), MEAN (MICRONS) AND STANDARD DEVIATION FOR A LOG-NORMAL
C     PARTICLE SIZE FREQUENCY DISTRIBUTION                , OR IF A
C     TABULAR DISTRIBUTION IS USED, THE MEAN AND STANDARD DEVIATION ARE
C     DELETED AND REPLACED BY THE NUMBER OF ENTRIES IN THE TABLE. IF A
C     LOG-NORMAL DISTRIBUTION IS TO BE SUPPLIED BY THE PROGRAM, THE
C     MEAN AND STANDARD DEVIATION FIELDS ARE LEFT BLANK.
C
C     FOR UNDERGROUND BURSTS INPUT DEPTH OF BURST AS A NEGATIVE NUMBER
C
C     THE OUTPUT UNITS ARE MASS IN KILOGRAMS, LENGTH IN METERS, TIME IN
C     SECONDS, TEMPERATURE IN DEGREES KELVIN, YIELD IN KILOTONS,
C     DISTRIBUTION PARAMETERS IN MICRONS
C
C ************************  GLOSSARY  ***************************************
C
C     DETID(I)        INITIAL CONDITIONS IDENTIFICATION ARRAY
C     DIAM            MEAN DIAMETER OF PARTICLE SIZE DISTRIBUTION (MICRONS)
C     DMIN            DIAMETER OF SMALLEST PARTICLE SIZE (MICRONS)
C     IDISTR          CONTROL INTEGER FOR PARTICLE SIZE DISTRIBUTION
C                     0 - LOGNORMAL DISTRIBUTION
C                     1 - TABULAR DISTRIBUTION READ IN ON CARDS (ARRAY WHY)
C     IS              CONTROL INTEGER SPECIFIES WHETHER LOGNORMAL
C                     DISTRIBUTION IS SPECIFIED BY THE USER OR BY THE
C                     PROGRAM
C                     0 - PROGRAM SPECIFIED LOG-NORMAL DISTRIBUTION
C                     1 - USER SPECIFIED LOG-NORMAL DISTRIBUTION
C     ISIN            SYSTEM INPUT TAPE
C     ISOUT           SYSTEM OUTPUT TAPE
C     N               CONTROL INTEGER - NUMBER OF INPUT BURSTS
C     NDSTR           LENGTH OF ARRAY WHY
C     NN              INTEGER - TESTS NUMBER OF BURSTS RUN AGAINST THE
C                     NUMBER OF BURSTS TO BE RUN
C     RMIN            RADIUS OF SMALLEST PARTICLE SIZE (MICRONS)
C     SD              STANDARD DEVIATION OF PARTICLE SIZE DISTRIBUTION
C     SSAM            MASS OF CONDENSED PHASE MATERIAL AT SPECIFICATION
C                     TIME
C     TME             TIME OF INITIAL CONDITIONS SPECIFICATION
C     TMP1            AVERAGE TEMPERATURE OF GAS IN CLOUD
C     TMP2            AVERAGE TEMPERATURE OF CONDENSED PHASE MATERIAL IN
C                     CLOUD
C     T2M             TEMPORARY STORAGE
C     U               SOIL CLASS INDICATOR
C                     1.0 FOR SILICEOUS
C                     0.0 FOR CALCAREOUS
C     VPR             MASS OF VAPOR IN CLOUD AT SPECIFICATION TIME
C     W               WEAPON YIELD (KT)
C     WHY(I)          ARRAY OF FRACTION OF TOTAL PARTICULATE MASS IN I-TH
C                     PARTICLE SIZE CLASS, MAXIMUM LENGTH OF ARRAY = 40
C     X               HEIGHT OF BURST (METERS)
C     Z               SCALED HEIGHT OF BURST
C
C ***************************************************************************
```

```
C
      COMMON /SET1/
     1          DIAM    ,DETID(12),IRISE  , IEXEC   , ISIN    , ISOUT     ,
     2          SD      , SPAR    , SSAM   , TME     , TMP1    , TMP2      ,
     3          T2M     , U       , VPR    , W       , X       , Z         ,
     4          WHY(40), NDSTR   , IDISTR , SPAR1   , SPAR2   , SPAR3     ,
     5          SPAR4   , RMIN    , SPAR6  , SPAR7   , SPAR8   , SPAR9
C
C ************************************************************************
C
 1    FORMAT(12A6)
 2    FORMAT(/3X,60HTHE SPECIFIED STANDARD DEVIATION IS NEGATIVE HENCE I
     1NCORRECT///)
 3    FORMAT(5F10.3)
 4    FORMAT(///25X28H****  INPUT PARAMETERS  ****/20X,5HYIELD,40X,E12.5
     1,2X,2HKT/20X,24HHEIGHT OR DEPTH OF BURST,21X,E12.5,2X,6HMETERS/20X
     2,13HSOIL CATEGORY)
 5    FORMAT(1H+,65X,9HSILICEOUS)
 6    FORMAT(1H+,65X,10HCALCAREOUS)
 7    FORMAT(//20X50HPRE-SHOT SOIL PARTICLE SIZE FREQUENCY DISTRIBUTION/
     125X32HA LOG-NORMAL DISTRIBUTION WITH -/30X,4HMEAN,31X,E12.5,2X,7HM
     2ICRONS/30X,18HSTANDARD DEVIATION,17X,E12.5          /25X,34HTHI
     3S DISTRIBUTION WAS SPECIFIED BY)
 8    FORMAT(1H+,65X,11HTHE PROGRAM)
 9    FORMAT(1H+,65X,8HTHE USER)
 10   FORMAT(I5)
 11   FORMAT(/3X,58HTHE SCALED DEPTH OF BURST IS BEYOND THE SCOPE OF THE
     1 MODEL///)
 12   FORMAT(/3X,111HTHE SCALED HEIGHT OF BURST IS SUCH THAT THERE IS NO
     1 SOIL MASS ENTRAINED IN THE CLOUD AND HENCE NO LOCAL FALLOUT///)
 13   FORMAT(///25X37H****  INITIAL CLOUD PROPERTIES AT H =E12.5,14H SEC
     1ONDS  ****//20X,23HAVERAGE GAS TEMPERATURE38X,E12.5,2X,14HDEGREES 
     2KELVIN//20X,56HAVERAGE TEMPERATURE OF CONDENSED PHASE MATERIAL IN 
     3CLOUD,5X,E12.5,2X,14HDEGREES KELVIN//20X,31HMASS OF VAPORIZED SOIL
     4 IN CLOUD,30X,E12.5,2X,9HKILOGRAMS//20X41HMASS OF CONDENSED PHASE 
     5MATERIAL IN CLOUD,20X,E12.5,2X,9HKILOGRAMS//20X,84HPARTICLE SIZE F
     6REQUENCY DISTRIBUTION AT THE TIME OF INITIAL CONDITIONS SPECIFICAT
     7ION)
 14   FORMAT(1H1///51X,14H**** DATA SET 12,6H  ****///)
 15   FORMAT(1X,14HLEAVING LINK 1)
 16   FORMAT(1H1///51X19H* * * * * * * * * *//12X101HT H E   D E P A R T
     1 M E N T   O F   D E F E N S E   F A L L O U T   P R E D I C T I O
     2 N   S Y S T E M//51X,19H* * * * * * * * * *////43X,36HINITIAL CO
     3NDITIONS (FIREBALL) MODULE///55X,11HPREPARED BY/43X,34HTECHNICAL O
     4PERATIONS RESEARCH,INC./52X,17HBURLINGTON, MASS.////25X,45H****  I
     5NITIAL CONDITIONS IDENTIFICATION  ****/25X,12A6)
 17   FORMAT(/3X,60HTHE SPECIFIED MEAN PARTICLE SIZE IS NEGATIVE HENCE I
     1NCORRECT///)
 18   FORMAT(//20X50HPRE-SHOT SOIL PARTICLE SIZE FREQUENCY DISTRIBUTION/
     125X41HA TABULATED EMPIRICAL DISTRIBUTION WITH -/30XI2,2X,21HPARTIC
     2LE SIZE CLASSES/30X,25HMINIMUM PARTICLE DIAMETER,10X,E12.5,2X,7HMI
     3CRONS/25X,43HTHIS DISTRIBUTION WAS SPECIFIED BY THE USER)
 19   FORMAT(25X,37HTHE DISTRIBUTION IS LOG-NORMAL WITH -/30X,4HMEAN,31X
     1,E12.5,2X,7HMICRONS/30X,18HSTANDARD DEVIATION,17X,E12.5
     2  /30X,25HMINIMUM PARTICLE DIAMETER,10X,E12.5,2X,7HMICRONS)
 191  FORMAT(25X,48HTHE DISTRIBUTION IS THE SAME AS THAT GIVEN ABOVE)
 192  FORMAT(//51X,19H* * * * * * * * * *//)
 193  FORMAT(//31X,19HPARTICLE SIZE CLASS,20X,13HMASS FRACTION/)
 194  FORMAT(40X,I2,29X,E12.5)
C
```

```
C ***********************************************************************
C ***********************************************************************
C
      NN=1
C     READ INITIAL CONDITIONS RUN IDENTIFIER
      READ (ISIN,1)(DETID(J),J=1,12)
C     READ CONTROL INTEGER
      READ (ISIN,10)N
C
C     WRITE OVERALL TITLE
      WRITE (ISOUT,16)(DETID(J),J=1,12)
 20   READ(ISIN,10)IDISTR
      IF(IDISTR)210,210,211
C 210 TEST FOR PARTICLE SIZE FREQUENCY SPECIFICATION OPTION
 210  READ(ISIN,3)W,X,U,DIAM,SD
      READ(ISIN,3)DMIN
      RMIN=0.5*DMIN
C     WAS A PRESHOT PARTICLE LOG-NORMAL DISTRIBUTION SPECIFIED BY
C     THE USER    YES TO 22
      IF(DIAM)21,21,22
 21   IS=0
      GO TO 23
 22   IS=1
      GO TO 23
 211  READ(ISIN,3)W,X,U
      READ(ISIN,3)DMIN
      RMIN=0.5*DMIN
      READ(ISIN,10)NDSTR
      READ(ISIN,3)(WHY(I),I=1,NDSTR)
C
C 23  CONVERT HOR - DOB FROM METERS TO FEET
 23   X=X/0.3048
C     Z IS THE SCALED HOB - DOB
 60   Z=X/((W)**(1.0/3.4))
C
C     TEST THE DATA TO SEE IF THE MODEL IS APPROPRIATE
      IF(X)66,63,63
 63   IF(Z-180.0)70,70,150
 66   IF(Z+20.0)143,70,70
 70   CALL TIME
      CALL TEMP
      CALL MASS
      CALL VAPOR
      IF(IDISTR)90,90,96
C
C     TEST FOR ACCEPTABLE SPECIFICATIONS OF PRE-SHOT PARTICLE SIZE
C     FREQUENCY DISTRIBUTION.
 90   IF(SD)91,92,92
 91   WRITE (ISOUT,2)
      GO TO 93
 92   IF(DIAM)94,95,96
 94   WRITE (ISOUT,17)
C 93  SHOULD THE RUN BE HALTED.    YES TO 190
 93   IF(N)190,190,170
C
 95   CALL DSTRN
C
C     CONVERT HOR - DOB BACK TO METERS FROM FEET
 96   X=X*0.3048
C
```

```
C     CONVERT VPR AND SSAM FROM GRAMS TO KILOGRAMS
      VPR=VPR/1000.0
C     DURING COMPUTATION SSAM CONTAINS THE VALUE OF THE TOTAL MASS OF
C     GAS AND CONDENSED PHASE MATERIAL IN THE CLOUD.
      SSAM=SSAM/1000.0-VPR
C
C     WRITE INI IAL CONDITIONS RESULTS
      WRITE (ISOUT,4)W,X
      IF(U-1.0)301,301,302
 301  WRITE (ISOUT,5)
      GO TO 305
 302  WRITE (ISOUT,6)
 305  IF(IDISTR)310,310,311
 310  WRITE(ISOUT,7)DIAM,SD
      IF (IS)102,103,102
 311  WRITE(ISOUT,16)NDSTR,DMIN
      WRITE(ISOUT,193)
      WRITE(ISOUT,194)(I,WHY(I),I=1,NDSTR)
      GO TO 106
 103  WRITE (ISOUT,8)
      GO TO 106
 102  WRITE (ISOUT,9)
 106  WRITE(ISOUT,13)TME,TMP1,TMP2,VPR,SSAM
      IF(IDISTR)116,116,117
 116  WRITE(ISOUT,19)DIAM,SD,DMIN
      GO TO 118
 117  WRITE(ISOUT,191)
 118  WRITE(ISOUT,192)
      GO TO 171
 143  WRITE (ISOUT,11)
      GO TO 171
 150  WRITE (ISOUT,12)
C
C     TEST TO DETERMINE WHETHER TO CALL LINK 2, RETURN TO COMPUTE
C     ANOTHER SET OF INITIAL CONDITIONS , OR EXIT.
 171  IF(N-1)200,200,170
 170  IF(N-NN)190,190,180
 180  NN=NN+1
      WRITE (ISOUT,14)NN
      GO TO 20
 200  WRITE (ISOUT,15)
      RETURN
 190  STOP
      END
$IBFTC DSTB   LIST,DECK,M94/2
      SUBROUTINE DSTBN
C
C **************************************** ************************
C
      COMMON /SET1/
     1        DIAM   , FID    , IRISE  , IEXEC  , ISIN   , ISOUT   ,
     2        SD     , SPAR   , SSAM   , TME    , TMP1   , TMP2    ,
     3        T2M    , U      , VPR    , W      , X      , Z       ,
     4        WHY    , NDSTR  , IDISTR , SPAR1  , SPAR2  , SPAR3   ,
     5        SPAR4  , RMIN   , SPAR6  , SPAR7  , SPAR8  , SPAR9
      DIMENSION FID(12)
      DIMENSION WHY(40)
C
C *****************************************************************
C *****************************************************************
```

```
C
      DIAM=0.407
      SD=4.00
      RETURN
      END
$IBFTC MAS     LIST,DECK,M94/2
      SUBROUTINE MASS
C
C ***********************************************************************
C
      COMMON /SET1/
     1          DIAM    , FID     , IRISE   , IEXEC   , ISIN    , ISOUT    ,
     2          SD      , SPAR    , SSAM    , TME     , TMP1    , TMP2     ,
     3          T2M     , U       , VPR     , W       , X       , Z        ,
     4          WHY     , NDSTR   , IDISTR  , SPAR1   , SPAR2   , SPAR3    ,
     5          SPAR4   , RMIN    , SPAR6   , SPAR7   , SPAR8   , SPAR9
      DIMENSION FID(12)
      DIMENSION WHY(40)
C
C ***********************************************************************
C ***********************************************************************
C
C     HOB  OR DOB
      IF(X)230,240,240
 230  D=2181.595
      Q=-Z
      R=1.125E+02+(7.55E-01)*Q-(9.6E-06)*(Q**3.0)-(9.11E-12)*(Q**5.0)
      S=3.27E+01+(8.51E-01)*Q-(2.52E-05)*(Q**3.0)+(1.78E-10)*(Q**5.0)
      SSAM= D*((W)**(3.0/3.4))*(R**2.0)*S
      GO TO 250
 240  E=77.40685
      SSAM= E*((W)**(3.0/3.4))*((180.0-Z)**2.0)*(360.0+Z)
 250  RETURN
      END
$IBFTC TEM     LIST,DECK,M94/2
      SUBROUTINE TEMP
C
C ***********************************************************************
C
      COMMON /SET1/
     1          DIAM    , FID     , IRISE   , IEXEC   , ISIN    , ISOUT    ,
     2          SD      , SPAR    , SSAM    , TME     , TMP1    , TMP2     ,
     3          T2M     , U       , VPR     , W       , X       , Z        ,
     4          WHY     , NDSTR   , IDISTR  , SPAR1   , SPAR2   , SPAR3    ,
     5          SPAR4   , RMIN    , SPAR6   , SPAR7   , SPAR8   , SPAR9
      DIMENSION FID(12)
      DIMENSION WHY(40)
C
C ***********************************************************************
C ***********************************************************************
C
C     COMPUTE VAPOR TEMPERATURE
      Q=Z*W**(-.03921)
      A=5980.*((1.145)**(Q/180.))*((W)**(-0.03948+0.02637*Q/180.0))
      B=-0.4473*(W**(0.04360))
      TMP1=A*((TME/T2M)**B)+1500.0
C
C     COMPUTE CONDENSED PHASE MATERIAL TEMPERATURE
      TMP2=50.0*ALOG10(W)+1400.0
      RETURN
```

```
      END                                                               TEM
$IBFTC TIM     LIST,DECK,M94/2                                          TIM
      SUBROUTINE TIME                                                   TIM
C                                                                       TIM
C ***********************************************************************TIM
C                                                                       TIM
      COMMON /SET1/                                                     TIM
     1          DIAM   , FID    , IRISE  , IEXEC  , ISIN   , ISOUT    , TIM
     2          SD     , SPAR   , SSAM   , THE    , TMP1   , TMP2     , TIM
     3          T2M    , U      , VPR    , W      , X      , Z        , TIM
     4          WHY    , NDSTR  , IDISTR , SPAR1  , SPAR2  , SPAR3    , TIM
     5          SPAR4  , RMIN   , SPAR6  , SPAR7  , SPAR8  , SPAR9      TIM
      DIMENSION FID(12)                                                 TIM
      DIMENSION WHY(40)                                                 TIM
C                                                                       TIM
C ***********************************************************************TIM
C ***********************************************************************TIM
C                                                                       TIM
      Q=Z*W**(-.03921)                                                  TIM
      T2M=0.037*((0.045/0.037)**(Q/180.))*(W**(0.49-(0.07*Q/180.,)))    TIM
      THE=(56.0*T2M)/(W**(0.3))                                         TIM
      RETURN                                                            TIM
      END                                                               TIM
$IBFTC VAPO    LIST,DECK,M94/2                                          VAPO
      SUBROUTINE VAPOR                                                  VAPO
C                                                                       VAPO
C ***********************************************************************VAPO
C                                                                       VAPO
      COMMON /SET1/                                                     VAPO
     1          DIAM   , FID    , IRISE  , IEXEC  , ISIN   , ISOUT    , VAPO
     2          SD     , SPAR   , SSAM   , THE    , TMP1   , TMP2     , VAPO
     3          T2M    , U      , VPR    , W      , X      , Z        , VAPO
     4          WHY    , NDSTR  , IDISTR , SPAR1  , SPAR2  , SPAR3    , VAPO
     5          SPAR4  , RMIN   , SPAR6  , SPAR7  , SPAR8  , SPAR9      VAPO
      DIMENSION FID(12)                                                 VAPO
      DIMENSION WHY(40)                                                 VAPO
C                                                                       VAPO
C ***********************************************************************VAPO
C ***********************************************************************VAPO
C                                                                       VAPO
C     BRANCH ON THE BASIS OF SOIL CATEGORY   -SILICEOUS TO 100,         VAPO
C     CALCAREOUS TO 200                                                 VAPO
      IF(U-1.0)100,100,200                                              VAPO
C                                                                       VAPO
C     IS THE COMPUTED VAPOR TEMPERATURE HIGHER THAN THE SILICEOUS SOIL  VAPO
C     BOILING TEMPERATURE                                               VAPO
  100 IF(TMP1-3000.0)120,120,110                                        VAPO
  110 VPR=SSAM*0.00015*(TMP1-3000.0)                                    VAPO
      GO TO 130                                                         VAPO
C                                                                       VAPO
C     IS THE COMPUTED VAPOR TEMPERATURE HIGHER THAN THE CALCAREOUS SOIL VAPO
C     BOILING TEMPERATURE                                               VAPO
  200 IF(TMP1-3100.0)120,120,115                                        VAPO
  115 VPR=SSAM*0.00015*(TMP1-3100.0)                                    VAPO
      GO TO 130                                                         VAPO
  120 VPR=0.0                                                           VAPO
  130 RETURN                                                            VAPO
      END                                                               VAPO
  130 RETURN                                                            VAPO
$IBFTC LNK2    LIST,DECK,M94/2                                          LNK2
```

```
      SUBROUTINE LINK2
C
C     23 MARCH 1967
C
C ******************************************************************
C
C                       CLOUD RISE MODULE GLOSSARY
C
C
C       UNITS ARE MKS EXCEPT WHERE NOTED.
C
C
C  ALT    - ARRAY(260), ATMOSPHERE ALTITUDE IN METERS(MSL) CORRESPONDING
C           TO ATP, ETA, GRV, PRS, PV, RHZ, RLH, SLM
C           GRV, PRS, RHZ, RLH, AND SLM
C           (SEE ICRD)
C  AMSS   - CUMULATIVE(FOR ALL PARTICLE SIZE CLASSES) TOTAL(FOR BOTH
C           IN-CLOUD AND BELOW-CLOUD)MASS FRACTION OF SOIL
C           (USED AS A DEBUG DIAGNOSTIC - SHOULD ALWAYS EQUAL ONE)
C  AP     - ARRAY(8) , TEMPORY STORAGE USED IN ATMR
C  ATMR   - SUBROUTINE, READS IN          TABLES OF ALT, ATP, ETA,
C  ATEMP  - (SEE DEFINITION OF ETA)
C  ATID   - ARRAY (12), 72 ALPHANUMERIC CHARACTERS FOR
C           ATMOSPHERE IDENTIFICATION
C  ATP    - ARRAY(260) ATMOSPHERE TEMPERATURE (K) MATCHES ALT
C  BARMU  - MEAN OF THE LOG NORMAL (BASE 10) PARTICLE SIZE VS.
C           MASS DISTRIBUTION
C  BZ     - DEPOSIT INCREMENT LINEAR DIMENSION
C  B0     - COEFFICIENT OF QUADRATIC IN T FOR C SUB PA
C  B1     - SEE DEFINITION OF B0
C  B2     - SEE DEFINITION OF B0
C  CG     - ARRAY (40), FALLING SPEEDS OF PARTICLES IN THE CLOUD
C  CF     - ARRAY( 40 ,40 ), USED FOR STORAGE OF COLLISION FUNCTIONS
C           USED IN PARTICLE GROWTH CALCULATIONS
C  CHANGE - CLOUD TIME AFTER WHICH STEP LENGTH BECOMES DST2
C  CMEAN  - GEOMETRIC MEAN OF THE LOG NORMAL PARTICLE SIZE VS. MASS
C           DISTRIBUTION COMPUTED IN CRM
C  CMLR   - TOTAL CLOUD MASS LOSS RATE
C  COLLIS - SUBROUTINE, COMPUTES COLLISION FUNCTION VALUES FOR USE IN
C           PARTICLE COALESCENSE CALCULATIONS
C  CPFR   - SUBROUTINE, COMPUTES PARTICLE FALLOUT RATE DURING CLOUD
C           RISE CALCULATIONS
C  CPV    - SUBROUTINE, COMPUTES INITIAL CRM VARIABLES
C           (SEE CRM)
C  CRID   - (SEE DEFINITION OF DNID)
C  CRM    - SUBROUTINE, COMPUTES CLOUD RISE AND EXPANSION VARIBLES
C  CRMW   - SUBROUTINE, PRINT CRM OUTPUT
C           (SEE CRM)
C  CSIGMA - GEOMETRIC STANDARD DEVIATION, SEE CMEAN
C  CX     - ARRAY (10, 90), CLOUD DIMENSIONS VS. TIME
C           (1, J) - TIME (SEC) AFTER BURST
C           THE MNEMONIC CX(1,J) IS CHANGED TO TC IN LINK 4
C           (2, J) - CLOUD TIME INTERVAL (SEC) BEGINNING AT CX (1, J)
C           (3, J) - CLOUD BASE (M) AT CX (1, J)
C           THE MNEMONIC CX(3,J) IS CHANGED TO ZB IN LINK 4
C           (4, J) - CLOUD TOP (M) AT CX (1, J)
C           THE MNEMONIC CX(4,J) IS CHANGED TO ZB IN LINK 4
C           (5, J) - CLOUD RADIUS (M) AT CX (1, J)
C           (6, J) - CLOUD BASE RATE (M/SEC) DURING CX (2, J)
C           THE MNEMONIC CX(6,J) IS CHANGED TO VB IN LINK 4
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C             (7, J) - CLOUD TOP RATE (M/SEC) DURING CX (2, J)
C             THE MNEMONIC CX(7,J) IS CHANGED TO VT IN LINK 4
C             (8, J) - CLOUD RADIAL RATE (M/SEC) DURING CX (2, J)
C             (9, J) - CLOUD TEMPERATURE (K) AT CX (1, J)
C             (10, J) - IN-CLOUD GAS DENSITY(KG/M**3) AT CX(1,J)
C  CXPN    - SUBROUTINE, TABULATES CX
C             (SEE CRM)
C  C3      - EMPIRICAL CONSTANT IN KINETIC ENERGY DISSIPATION RATE
C  DEK     - DERIVATIVE OF EK
C  DENT    - DATA STATEMENT USED FOR IDENTIFICATION OF IRISE TAPE
C  DERIV   - SUBROUTINE, EVALUATES DERIVATIVES OF CLOUD RISE VARIABLES
C             (SEE CRM)
C  DETID   - ARRAY(12), DETONATION IDENTIFICATION CARD
C  DIAM    -     PARTICLE GEOMETRIC MEAN SIZE (MICRONS) OF LOG NORMAL
C             PARTICLE SIZE FREQUENCY FUNCTION SUPPLIED BY LINK1.
C             IF NOT PUNCHED DIAM=0.407
C  DMLR    - INTEGRATED REFRACTORY MASS FALLOUT (FRACTION OF TOTAL)
C  DNID    - ARRAY (12), 72 ALPHANUMERIC RUN IDENTIFICATION FOR WHICH
C             EACH BRSTID IS A RUN CYCLE
C             THE MNEMONIC DNID IS CHANGED TO CRID IN LINK 4
C  DNS     - SOIL DENSITY (GM/CM**3) AT GROUND ZERO
C             IF NOT PUNCHED, DNS = 2.6
C  DNSTY   - PARTICLE DENSITY
C  DPST    - ARRAY (12), DEPOSIT INCREMENT VARIABLES, COMPILED IN
C             ARRAY GDPST
C             (1) - X COORDINATE (RESERVED FOR) OF INCREMENT CENTER
C             (2) - Y COORDINATE (RESERVED FOR) OF INCREMENT CENTER
C             (3) - SPARE
C             (4) - TIME (SEC) COORDINATE
C             (5) - INCREMENT RADIUS (M) AT TIME DPX (4)
C             (6) - INCREMENT P.S.C. MIDPOINT (MICRONS)
C             (7) - SPARE
C             (8) - INCREMENT NUMBER ASSIGNED IN ORDER COMPUTED
C             (9) - THRSTZ
C             (10) - SPARE
C             (11) - MASS PER UNIT AREA
C             (12) - INCREMENT ALTITUDE (M, MSL)
C  DPSTK   - NUMBER OF DPST PER P.S.C.
C  DPSTZ   - ARRAY (12), DPST VARIABLES USED TO COMPUTE INITIAL
C             ALTITUDE OF A DEPOSIT INCREMENT CENTER
C             (1) - DPST THICKNESS (M)
C             (2) - DPST ALTITUDE (M)
C             (3-12) - EMPTY
C  DPVOL   - DERIVATIVE OF PVOL
C  DPX     - ARRAY  (3, 90), DEPOSIT INCREMENT RISE AND EXPANSION VARIABL
C             (1, J) - LIFT RATE FACTOR AT / ABOVE CLOUD BASE (1/SEC)
C             (2, J) - LIFT RATE FACTOR BELOW CLOUD BASE (1/SEC)
C             (3, J) - EMPTY
C  DRM     - DERIVATIVE OF RM
C  DS      - DERIVATIVE OF S
C  DST     - INITIAL INTEGRATION STEP LENGTH
C  DSTR    - SUBROUTINE, COMPUTES PARTICLE-SIZE DISTRIBUTION PARAMETERS,
C             CMEAN AND CSIGMA
C             (SEE CRM)
C  DST1    - STEP LENGTH FOR 1 LESS THAN TIME LESS THAN CHANGE
C  DST2    - INTEGRATION STEP LENGTH AFTER TIME CHANGE
C  DT      - DERIVATIVE OF T
C  DU      - DERIVATIVE OF U
C  DV      - DERIVATIVE OF V
C  DVBL    - ARRAY (60), FOR TRANSMISSION OF VARIABLE DERIVATIVES
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C  DVD    - SUBROUTINE, COMPUTES DPSTK AND KDPST                              LNK2 121
C           (SEE RSXP)                                                       LNK2 122
C  DWT    - DERIVATIVE OF WT                                                 LNK2 123
C  DX     - DERIVATIVE OF X                                                  LNK2 124
C  DY     - ARRAY (40), DERIVATIVES OF Y                                     LNK2 125
C  DZ     - DERIVATIVE OF Z                                                  LNK2 126
C  D0     - COEFFICIENT OF QUADRATIC IN T FOR C SUB PW                       LNK2 127
C  D1     - SEE DEFINITION OF D0                                             LNK2 128
C  D2     - SEE DEFINITION OF D0                                             LNK2 129
C  ED     - EDDY VISCOSITY LOSS RATE OF KINETIC ENERGY OF RISE               LNK2 130
C  EK     - KINETIC ENERGY DENSITY                                           LNK2 131
C  EPS    - KINETIC ENERGY LOSS RATE                                         LNK2 132
C  ERROR  - SUBROUTINE, FOR GENERAL UTILITY ERROR INDICATION                 LNK2 133
C           (SEE DASA-1800-VII)                                              LNK2 134
C  ES     - SATURATION PRESSURE OF WATER VAPOR (INVALID FOR TEMPERATURE LNK2 135
C           ABOVE BOILING POINT OF WATER)                                    LNK2 136
C  ETA    - ARRAY(260) ATMOSPHERE AIR COEFFICIENT OF VISCOSITY               LNK2 137
C           (GM/CM/SEC) MATCHES ALT                                          LNK2 138
C           THE MNEMONIC ETA IS CHANGED TO ATEMP IN LINK 4. THE UNITS OFLNK2 139
C           ATEMP ARE KGM/M/SEC                                              LNK2 140
C  F      - FRACTION OF W IN FIREBALL AT START OF RISE                       LNK2 141
C  FALRAT - SUBROUTINE, COMPUTES PARTICLE SETTLING RATE IN RSXP              LNK2 142
C           (SEE DASA-1800-IV)                                               LNK2 143
C  FLAMDA - KOLMOGOROV MICROSCALE                                            LNK2 144
C  FMAS   - (SEE DEFINITION OF GDPST(5,J))                                   LNK2 145
C  FMASS  - ARRAY(200),PARTICLE SIZE CLASS FRACTION OF TOTAL MASS LIFTEDLNK2 146
C  FMT    - OBJECT-TIME FORMAT USED TO READ ATMOSPHERE TABLES                LNK2 147
C  FMU    - SUTHERLAND EXPRESSION FOR THE VISCOSITY OF AIR                   LNK2 148
C  FNU    - FMU/PA(EQUALS KINEMATIC VISCOSITY)                               LNK2 149
C  FRAC   - FRACTION OF MASS WHICH HAS EITHER FALLEN OUT OF THE CLOUD        LNK2 150
C           OR IS STILL CONTAINED IN THE CLOUD                               LNK2 151
C  FSPEED - SUBROUTINE, GENERATES THE PARTICLE FALLING SPEEDS                LNK2 152
C           (SEE CRM)                                                        LNK2 153
C  FW     - FISSION YIELD IN KILOTONS                                        LNK2 154
C  GAUSSP - SUBROUTINE, EVALUATES THE GAUSSIAN PROBABILITY INTEGRAL          LNK2 155
C           (SEE CRM)                                                        LNK2 156
C  GDPST  - ARRAY(6,100), DEPOSIT INCREMENT VARIABLES                        LNK2 157
C  (1,J)  - PARTICLE X COORDINATE                                            LNK2 158
C  (2,J)  - PARTICLE Y COORDINATE                                            LNK2 159
C  (3,J)  - TIME COORDINATE                                                  LNK2 160
C  (4,J)  - PARTICLE DIAMETER (MICRONS)                                      LNK2 161
C  (5,J)  - MASS PER UNIT AREA                                               LNK2 162
C  (6,J)  - PARTICLE Z COORDINATE                                            LNK2 163
C  GMASS  - FRACTION OF THE TOTAL NON-WATER MASS WHICH HAS FALLEN OUT OFLNK2 164
C           THE CLOUD TO THE STATED TIME EXCEPT LAST STEP WHEN IT            LNK2 165
C           DENOTES THE FRACTION OF THE ORIGINAL NON-WATER MASS STILL        LNK2 166
C           CONTAINED IN THE CLOUD.                                          LNK2 167
C  GPSD   - SUBROUTINE, COMPUTES P.S.C. MIDPOINTS FOR                        LNK2 168
C           PARTICLE SIZE VS. MASS DISTRIBUTION                              LNK2 169
C  GRV    - ARRAY(260) ACCELERATION DUE TO GRAVITY                           LNK2 170
C           (CM/SEC/SEC) MATCHES ALT                                         LNK2 171
C  HEIGHT - HEIGHT OF BURST (METERS)                                         LNK2 172
C  HOB    - HEIGHT (FT) OF BURST ABOVE BURST GROUND ZERO  ZBRSTZ)            LNK2 173
C  HSCL   - SCALED HEIGHT OF BURST (FT)                                      LNK2 174
C  ICRD   - SUBROUTINE, READS LINK 2 INPUT CARDS                             LNK2 175
C  IDISTR - PARTICLE DISTRIBUTION CONTROL PARAMETER                          LNK2 176
C           0 - A LOGNORMAL DISTRIBUTION IS SPECIFIED                        LNK2 177
C           1 - A TABULAR DISTRIBUTION IS SPECFIED                           LNK2 178
C  IEXEC  - CONTROL INTEGER FOR CALLING PROGRAM LINKS                        LNK2 179
C  INTR   - NUMBER OF 0.5 PERCENT INTERVALS IN A P.S.C.                      LNK2 180
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C            (1 THRU 200)
C   IPAM   - CONTROL INTEGER FOR PAM OPTION
C            0 - NO PAM CALL
C            1 - CALL PAM
C   IRAD   - NUMBER OF DEPOSIT INCREMENT AREA SUBDIVISIONS
C   IRISE  - LOGICAL DESIGNATION FOR TAPE USED FOR TEMPORY STORAGE IN
C            ATMR AND FOR RSXP OUTPUT
C   ITAB   - NUMBER OF PARTICLE SIZE CLASSES  COMPUTED IN GPSD
C            THE MNEMONIC ITAB IS CHANGED TO NPS IN LINK 4
C   JBASE  - COMPUTED GO TO INDEX
C            1 - CONTINUE DPST TRAJECTORY COMPUTATION
C            2 - DPST TRAJECTORY COMPLETE
C   JPSC   - PARTICLE SIZE CLASS SELECTOR
C   KBASE  - COMPUTED GO TO INDEX
C            1 - ADJUST DPST RADIUS AND ACTIVITY FOR LEAVING CLOUD
C            2 - ADJUSTMENT OF 1 HAS BEEN MADE
C   KCLD   - CONTROL INDEX FOR CRM DEBUG PRINTOUT,
C            0 - NO DEBUG PRINT OUT
C            1 - DEBUG PRINT OUT
C   KCX    - NUMBER OF DPST RISE AND EXPANSION INTERVALS
C   KDI    - NUMBER OF DEPOSIT INCREMENT PER PSC
C            IF NOT PUNCHED, IT IS COMPUTED BY PROGRAM
C            (SEE RSXP)
C   KDPST  - SEE DPSTK
C   KEQ    - COMPUTATION CONTROL INDEX
C            0 - OMIT COAGULATION COMPUTATION IN CRM
C            1 - PERFORM COAGULATION COMPUTATION IN CRM
C            THESE DESIGNATIONS ARE CHANGED IN CPV
C   KRD    - UNIT NUMBER OF TAPE CONTAINING INPUT CARDS
C            FROM OFF-LINE CARD READER
C   KRX    - CONTROL INDEX FOR RSXP DEBUG PRINTOUT,
C            0 - NO DEBUG PRINT OUT
C            1 - DEBUG PRINT OUT
C   KSV    - INDEX WHICH DETERMINES FUNCTION OF NSTR
C            1 - PRESERVE VARIABLES AT START OF TIME STEP
C            2 - RESTORE VARIABLES TO THOSE AT START OF TIME STEP
C   KTR    - UNIT NUMBER OF TAPE CONTAINING OUTPUT FOR OFF-LINE PRINTER
C   KXT    - 1-THERE IS LOCAL FALLOUT
C            2-THERE IS NO LOCAL FALLOUT
C   LDZERO - FLAMDA
C   LODD   - LENGTH OF PARTICLE DESCRIPTION DATA BLOCK
C   MCX    - NUMBER OF TIME POINTS (ROWS) OF ARRAY CX
C            THE MNEMONIC MCX IS CHANGED TO NPOSIT IN RSXP
C   MU     - FMU
C   MWYA   - 1, INITIAL ENTRY INTO CXPN
C            2, REGULAR ENTRY
C            3, FINAL ENTRY
C   N      - CLOUD MODE SWITCH
C   NAT    - (SEE DEFINITION OF NPVA)
C   NDSTR  - NUMBER OF ENTRIES IN TABLE OF Y
C   NEQ    - NUMBER OF PARTICLE SIZE CLASSES IN CRM.
C            IF NOT PUNCHED, NEQ = 40
C            LIMITS OF NEQ = 1, 40
C          - IF THE EMPERICAL TABULAR DISTRIBUTION IS USED, THE PROGRAM
C            SETS THE VALUE OF NEQ AT NDSTR
C   NNN    - TOTAL NUMBER OF EQUATIONS BEING INTEGRATED
C   NP     - (SEE DEFINITION OF LODD)
C   NPOSIT - (SEE DEFINITION OF MCX)
C   NPS    - (SEE DEFINITION OF ITAB)
C   NPVA   - NUMBER OF ELEMENTS IN ALT AND CORRESPONDING ARRAYS
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C             LIMITS OF NPVA = 1,260
C             THE MNEMONIC NPVA IS CHANGED TO NAT IN LINK 4
C   NSP     - CONTROL INTEGER INDICATING TYPE OF DEBRIS DISTRIBUTION
C             OUTPUT BY THE CLOUD RISE CALCULATIONS
C             0 - HORIZONTALLY NONUNIFORM
C             1 - HORIZONTALLY UNIFORM
C             THIS CLOUD RISE MODEL PRODUCES ONLY A HORIZONTALLY
C             UNIFORM DISTRIBUTION
C   NTVL    - NUMBER OF EQUAL MASS P.S.C. IN OUTPUT DISTRIBUTION
C             IF NOT PUNCHED, ICRD SETS NTVL = 10
C             LIMITS OF NTVL = 1, 200
C             IF THE EMPIRICAL TABULAR DISTRIBUTION OPTION IS EXERCISED,
C             AND NTVL IS NOT SPECIFIED BY THE USER, THE PROGRAM SETS
C             THE VALUE OF NTVL AT NDSTR
C   NU      - FNU
C   P       - ATMOSPHERIC PRESSURE AT CLOUD CENTER ALTITUDE
C   PACT    - ARRAY(200), PARTICLE SIZE THAT INDICATES THE LOWER BOUND OF
C             A PARTICLE SIZE CLASS(SEE GPSD)
C   PAM     - DUMMY SUBROUTINE, PARTICLE ACTIVITY MODULE
C   PARDIS  - SUBROUTINE, GENERATE INITIAL MASS DISTRIBUTION
C             (SEE CRM)
C   PARTEQ  - SUBROUTINE, EVALUATES THE PARTICLE
C             NUMBER DISTRIBUTION DERIVATIVES
C             (SEE CRM)
C   PHI     - FRACTION OF F*W USED TO HEAT AIR
C   PRBT    - ARRAY (201), FRACTILES PER 0.5 PERCENT INTERVAL
C   PRINT   - END TIME OF COMPUTATION
C   PRS     - ARRAY(260) ATMOSPHERIC PRESSURE (MB)  MATCHES ALT
C   PS      - ARRAY(200), PARTICLE SIZE CLASS MIDPOINT IN MICRONS
C   PSIZ    - (SEE DEFINITION OF GDPST(4,J))
C   PV      - ARRAY(260), PARTICLE FALLING SPEEDS (M/SEC) PER ALT
C   PVOL    - MINIMUM PARTICLE VOLUME
C   PW      - PARTIAL PRESSURE OF WATER VAPOR IN THE CLOUD
C   P0      - GROUND LEVEL PRESSURE
C   PV      - ARRAY(260) - OUTSIDE-CLOUD PARTICLE FALL RATE (SEE RSXP)
C   PVI     - ARRAY( 90) -  INSIDE-CLOUD PARTICLE FALL RATE (SEE RSXP)
C   Q       - CONVERSION FACTOR FOR FRACTION MASS TO NUMBER OF PARTICLES
C                       PER M**3
C   QQ      - DUMMY VARIABLE
C   QI      - VIRTUAL MASS TERM
C   R       - CLOUD HORIZONTAL RADIUS
C   RA      - GAS DENSITY OF CLOUD
C   RAD     - ARRAY (40), RADII OF PARTICLE CLASSES
C   RADIUS  - DEPOSIT INCREMENT RADIUS
C   RFD     - DENSITY OF EXTRA MATERIAL IN CLOUD(MKS)(EQUALS DNS*1000.)
C   RFM     - MASS OF EXTRA MATERIAL IN CLOUD(EQUALS SSAM)
C   RF0     - COEFFICIENTS OF QUADRATIC IN T FOR C SUB PR
C   RF1     - SEE DEFINITION OF RF0
C   RF2     - SEE DEFINITION OF RF0
C   RHO     - (SEE DEFINITION OF RHZ)
C   RHOPS   - ARRAY( 90) - IN-CLOUD GAS DENSITY (SEE RSXP)
C   RHZ     - ARRAY(260)  ATMOSPHERE AIR DENSITY (GM/CM**3) MATCHES ALT.
C             THE MNEMONIC RHZ IS CHANGED TO RHO IN LINK 4. THE UNITS OF
C             RHO ARE KGM/M**3
C   RKGILL  - SUBROUTINE, USES RUNGE-KUTTA METHOD TO INTEGRATE
C             DIFFENTIAL EQUATIONS OF CLOUD
C             (SEE CRM)
C   RK2     - EMPIRICAL CONSTANT IN EDDY VISCOSITY
C   RK3     - VIRTUAL MASS FACTOR OPTION
C   RL      - EMPIRICAL CONSTANT IN ENTRAINMENT RATE
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C  RLM    - ARRAY(260)  ATMOSPHERE RELATIVE HUMIDITY MATCHES ALT           LNK2 301
C  RLL    - RADIUS USED TO CALCULATE DISSIPATION RATE                       LNK2 302
C  RM     - CLOUD MASS                                                      LNK2 303
C  RMA0   - INITIAL AIR MASS OF CLOUD                                       LNK2 304
C  RMIN   - MINIMUM PARTICLE RADIUS. IF NOT PUNCHED, RMIN IS COMPUTED       LNK2 305
C           IN CPV.                                                         LNK2 306
C  RMW0   - INITIAL WATER MASS OF CLOUD                                     LNK2 307
C  RSTR   - SUBROUTINE WHICH PRESERVES AND/OR RESTORES CRM VARIABLES        LNK2 308
C  RSXP   - SUBROUTINE, RISE AND EXPANSION MODEL  WHICH COMPUTES            LNK2 309
C           DEPOSIT INCREMENT POSITIONS AT END OF CLOUD INFLUENCE           LNK2 310
C  RZT    - VERTICAL CLOUD RADIUS AFTER R + Z = ZT                          LNK2 311
C  S      - CONDENSED SOIL AND SALT MIXING RATIO                            LNK2 312
C  SA     - RESERVED FOR SOIL PARAMETERS, NOT USED                          LNK2 313
C  SCALE  - ARRAY(10) , ATMOSPHERE TABLE ADJUSTMENT FACTORS                 LNK2 314
C  SCTN     SUBROUTINE, COMPUTES AND TABULATES DEPOSIT INCREMENT            LNK2 315
C            ISE AND EXPANSION VARIABLES                                    LNK2 316
C           .SEE RSXP)                                                      LNK2 317
C  SD     - PARTICLE GEOMETRIC STANDARD DEVIATION SUPPLIED BY LINK1         LNK2 318
C           SEE  DIAM. IF NOT PUNCHED, SD = 4.0                             LNK2 319
C  SIGMA  - STANDARD DEVIATION OF LOG-NORMAL STARTING DISTRIBUTION OF       LNK2 320
C                FRACTION MASS VS. DIAMETER. SEE CRM                        LNK2 321
C  SIZE   - PERCENT OF TOTAL MASS IN A PARTICLE SIZE CLASS                  LNK2 322
C  SLDTMP - PARTICLE SOLIDIFICATION TEMPERATURE (K)                         LNK2 323
C  SLM    - ARRAY(260)  ATMOSPHERE MEAN FREE PATH OF AIR MOLECULES(CM)      LNK2 324
C           MATCHES ALT                                                     LNK2 325
C  SMALLT - TIME AFTER START OF COMPUTATION                                 LNK2 326
C  SMSS   - ARRAY (40), MASS OF TOTAL SOIL FALLOUT                          LNK2 327
C           CORRESPONDING WITH PARTICLE RADIUS ARRAY RAD(40)                LNK2 328
C  SSAM   - TOTAL SOIL MASS (KG)                                            LNK2 329
C  SPARE1 - SPARE VARIABLE                                                  LNK2 330
C  SPARE3 - SPARE VARIABLE                                                  LNK2 331
C  SV     - ARRAY(200), SURFACE TO VOLUME RATIO OF I-TH PARTICLE SIZE       LNK2 332
C  SYSTEM - SUBROUTINE, GENERATES PARTICLE NUMBER DENSITY                   LNK2 333
C           (SEE CRM)                                                       LNK2 334
C  SZRO   - S AT INITIAL TIME                                               LNK2 335
C  T      - CLOUD TEMPERATURE (K)                                           LNK2 336
C  TC     - (SEE DEFINITION OF CX(1,J))                                     LNK2 337
C  TE     - ATMOSPHERIC TEMPERATURE AT CLOUD CENTER ALTITUDE                LNK2 338
C  TF     - FREEZING TEMPERATURE USED TO SELECT VALUE OF L                  LNK2 339
C  TIMCX  - ARRAY( 90) - CORRESPONDS TO  CX(1,J) (SEE RSXP)                 LNK2 340
C  TIME   - TIME THE CLOUD HAS LEFT AN ALTITUDE LAYER. SEE CRM              LNK2 341
C  TME    -     INITIAL TIME (SEC)  SUPPLIED BY LINK1                       LNK2 342
C  TMP1   -     INITIAL VAPOR TEMPERATURE (K) SUPPLIED BY LINK1             LNK2 343
C  TMP2   - INITIAL TEMPERATURE OF CONDENSED PHASE MATERIAL IN CLOUD        LNK2 344
C           SUPPLIED BY LINK1(NOT USED)                                     LNK2 345
C  TMSD   - TIME OF PARTICLE SOLIDIFICATION (SEC) WITHIN CLOUD              LNK2 346
C  TMZR   - CLOUD RISE START TIME (SEC) SUPPLIED BY LINK1                   LNK2 347
C  TP     - (SEE DEFINITION OF GDPST(3,J))                                  LNK2 348
C  TR     - BOILING TEMPERATURE OF EXTRA MATERIAL IN CLOUD                  LNK2 349
C  TRPL   - SUBROUTINE, USES LINEAR INTERPOLATION TO COMPUTE VARIABLE       LNK2 350
C           CORRESPONDING TO ARGUMENT                                       LNK2 351
C           (SEE CRM)                                                       LNK2 352
C           (SEE RSXP)                                                      LNK2 353
C  TRO    - MAXIMUM TEMPERATURE TO WHICH EXTRA MATERIAL HAS BEEN HEATED     LNK2 354
C  TSALT  - BOILING TEMPERATURE OF SALT (K)                                 LNK2 355
C  TW     - TOTAL YIELD IN KILOTONS                                         LNK2 356
C  TZR    - INITIAL CLOUD GAS TEMPERATURE SUPPLIED BY LINK1                 LNK2 357
C           (EQUALS TMP1)                                                   LNK2 358
C  U      - CLOUD VERTICAL VELOCITY                                         LNK2 359
C           (SEE CRM)                                                       LNK2 360
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C  UPVCS  - SUBROUTINE, UPDATES PARTICLE VOLUME FROM THE
C           CONDENSATION OF SALT
C  USOIL  - SOIL TYPE, 1.0 = SILICEOUS
C                      2.0 = CALCAREOUS
C           IF NOT PUNCHED, USOIL = 1.0
C  UNITS  - RESERVED FOR INDICES  WHICH WILL ALLOW PROGRAM TO RECOGNIZE
C           AND ADJUST INPUT BURST COORDINATES
C  V      - CLOUD VOLUME
C  VB     - (SEE DEFINITION OF CX(5,J))
C  VISPS  - ARRAY( 90) - IN-CLOUD AIR VISCOSITY (SEE RSXP)
C  VPR    - MASS OF VAPOR (KG) SUPPLIED BY LINK1
C  VT     - (SEE DEFINITION OF CX(7,J))
C  W      - TOTAL YIELD (KT)
C  WT     - SOLID AND LIQUID WATER MIXING RATIO
C  X      - WATER VAPOR MIXING RATIO
C           ALSO USED AS ALOG(PARTICLE RADIUS) IN PARDIS
C  XPAR   - (SEE DEFINITION OF GDPST(1,J))
C  Y      - ARRAY (40), PARTICLE MASS DISTRIBUTION TABLE
C           CORRESPONDING WITH PARTICLE RADIUS ARRAY RAD(40)
C           ALSO USED IN TERMS OF NUMBER OF IN-CLOUD PARTICLES/UNIT
C           VOLUME OF CLOUD
C  YPAR   - (SEE DEFINITION OF GDPST(2,J))
C  Z      - CLOUD CENTER ALTITUDE
C  ZB     - (SEE DEFINITION OF CX(3,J))
C  ZBFR   - MAXIMUM Z OF CURRENT OR PREVIOUS ENTRIES TABULATED BY CXPN
C  ZBRSTM - Z-COORDINATE OF BURST GROUND ZERO (METERS ABOVE MSL)
C  ZBRSTZ - Z-COORDINATE OF BURST GROUND ZERO (FT, MSL)
C  ZMSS   - ARRAY(40), FRACTION OF TOTAL SOIL MASS LIFTED
C           CORRESPONDING WITH PARTICLE RADIUS ARRAY RAD(40)
C  ZMZZ   - CUMULATIVE(OVER ALL PARTICLE SIZE CLASSES) MASS FRACTION
C           OF SOIL FALLOUT
C           (USED AS A DEBUG DIAGNOSTIC)
C  ZPAR   - (SEE DEFINITION OF GDPST(6,J))
C  ZRFR   - REFRACTORY EXPOSURE RATE TOTAL
C  ZT     - NOMINAL ALTITUDE OF TROPOPAUSE
C           ALSO SEE DEFINITION OF CX(4,J)
C  ZTRP   - NOMINAL ALTITUDE OF TROPOPAUSE(SAME AS ZT)
C  ZVSB   - DIFFERENCE BETWEEN ALTITUDE OF DPST (12) AND  CX (3, J)
C
C *******************************************************************
C
      COMMON /SFT1/
     1         DIAM    , DETID   , IRISE   , IEXEC   , KRD    , KTR      ,
     2         SD      , SPAR    , SSAM    , TME     , TMP1   , TMP2     ,
     3         T2M     , USOIL   , VPR     , TW      , HEIGHT , Z        ,
     4         Y       , NDSTR   , IDISTR  , SPAR1   , SPAR2  , SPAR3    ,
     5         SPAR4   , RMIN    , SPAR6   , SPAR7   , SPAR8  , SPAR9
      DIMENSION
     1  ATID (12), DNID(12)  , CXTIM(90),  CXTMP(90),
     2ALT(260),ATP(260),ETA(260),GRV(260),PRS(260),
     3RHZ(260),RLH(260),SLM(260),
     4  DETID(12)
      DIMENSION
     1  CF (40, 40), CX (10, 90),DPX(3,90)
      DIMENSION
     1    GDPST(6,100),      PS(200),FMASS(200),SV(200),PACT(200)
      DIMENSION Y(40),ZMSS(40),RAD(40)
      DIMENSION PV(260), PVI(90), TIMCX(90)
      EQUIVALENCE (PS(1),CF(1)),(FMASS(1),CF(201)),(SV(1),CF(401)),
     1(PACT(1),CF(601)),(GDPST(1),CF(801)),
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     2 (CXTIM(1),CF(1401)), (CXTMP(1),CF(1491)),(DPX(1),RLH(1))
      EQUIVALENCE (PV(1),GRV(1)), (PVI(1),SLM(1)), (TIMCX(1),SLM(91))
C
C ************************************************************************
C ************************************************************************
C
      HOB=HEIGHT/0.3048
      SSAM=SSAM+VPR
  020 CALL ICRD (
     1 ALT,ATID,ATP,DNID,DNS,ETA,NEQ,NPVA,NTVL,PRS,RHZ,RLH,TW,KRX,IRISE,
     2 SLM, ZBRSTZ,ZTRP,IRAD,IPAM,SLDTMP,FW,GRV,KCLD,KDI,KEQ,KRD,KTR)
C                                                  END ICRD ***********
  040 RFD = 1000.0 * DNS
      IF(IDISTR)700,700,701
  701 NEQ=NDSTR
  700 CALL CRM(
     1  ALT, ATP, CF, CMEAN, CSIGMA, CX, HOB, KCLD, KEQ, KTR, MCX,
     2  NEQ, NPVA, DIAM, PRS, SD, RFD, SSAM, RLM, RMIN,RAD,
     3  TME,TMP2,TW,TMP1,ZBRSTZ,ZTRP,Y,IDISTR,ZMSS,DNSTY,SLDTMP)
C                                                  END CRM ************
      IF(IDISTR)800,800,801
  800 SIGMA=0.43429448*ALOG(CSIGMA)
      BARMU = 0.43429448 * ALOG (CMEAN)
  801 CALL GPSD (
     1BARMU,ITAB,KRD,NTVL,       PS,FMASS,SV,PACT,SIGMA,IDISTR,ZMSS,
     2SSAM,NEQ,DNSTY,RAD)
C
C     PRINT FINAL PARTICLE SIZE CLASS TABLE
C
      WRITE(KTR,512 )(J,PS(J),PACT(J),FMASS(J),SV(J),J=1,ITAB)
  512 FORMAT(1H1,9X,67HPARTICLE SIZE, LOWER SIZE INTERVAL BOUNDRY, MASS
     1FREQUENCY, AND SURFACE- O-VOLUME RATIO/10X, 53HFOR USE IN RSXP, TR
     2ANSPORT, AND ACTIVITY CALCULATIONS//20X, 8HDIAMETER,  8X, 7HBOUNDR
     3Y, 5X,13HMASS FRACTION, 7X,3HS/V//(12X,I3,4(3X,E12.5)))
C                                          COMPUTE PARTICLE TIME
C                                          OF SOLIDIFICATION
      DO 122 MA=1,MCX
      MB=MCX-MA+1
      CXTIM(MA)=CX(1,MB)
  122 CXTMP(MA)=CX(9,MB)
      CALL TRPL (
     1  SLDTMP, MCX, CXTMP, CXTIM, TMSD)
C
C     PRINT TIME OF SOIL SOLIDIFICATION
C
      WRITE(KTR,513)TMSD
  513 FORMAT(1H0,9X, 30HTIME OF SOIL SOLIDIFICATION = F9.4,4H SEC)
C************************************************ BEGIN PAM
      SIGMA=2.302585*SIGMA
      IF(IPAM)50,50,60
   60 CALL PAM
C************************************************ BEGIN RSXP
   50 CALL RSXP(
     1  ALT, CX, DNS, ETA, GRV, ITAB, KDI, KRD, KRX, KTR,
     2      MCX,NPVA,PS,FMASS,SV,PACT,RHZ,SSAM,SLM,DPX,
     3   PV,PVI,TIMCX,          TW,  ZBRSTZ,DETID,DNID,IRAD,IRISE,
     4 SLDTMP,TMSD,FW,SIGMA,SPARE1,HOB,SPARE3,IDISTR)
C                                                  END RSXP*************
 1000 RETURN
      END
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$IBFTC ATMX    LIST,DECK,M94/2
      SUBROUTINE ATMR (
     1  ALT, ATP, ETA, GRV, KRD, NPVA, PRS, RHZ, RLH, SLM, ZTRP,KTR,
     2 IRISE)
C
C     PREPARED  3/17/67
C
C
C ***********************************************************************
C
C     ATMR READS IN ATMOSPHERE TABLES
C
C     ATMOSPHERE TABLE GLOSSARY- UNITS ARE FOR THE SCALED ENTRIES
C
C   1   ALT - ALTITUDE ABOVE MSL (METERS)
C   2   ATP - TEMPERATURE (DEGREES KELVIN)
C   3   PRS - PRESSURE (MB)
C   4   RHZ - DENSITY (GM/CM**3)
C   5   RLH - RELATIVE HUMIDITY (PERCENT)
C   6   ETA - VISCOSITY (GM/(CM-SEC))
C   7   GRV - ACCELERATION OF GRAVITY (CM/SEC**2)
C   8   SLM - MOLECULAR MEAN FREE PATH (CM)
C
C ***********************************************************************
C
      DIMENSION ALT(260),ATP(260),ETA(260),GRV(260),PRS(260),
     1RHZ(260),RLH(260),SLM(260) ,FMT(12),SCALE(10),ATMSUB(8),
     2 ATMZRO(8),ATMMAX(8),AP(8)
C
C ***********************************************************************
C
 010  FORMAT(I4)
   20 FORMAT(8I4)
   30 FORMAT(12A6)
   40 FORMAT(7F10.5/3F10.5)
C
C ***********************************************************************
C ***********************************************************************
C
      DATA PROGRM/6H ATMR /
      DATA ATMSUB
     1            /-1000.,294.66,.1347E-2,.18206E-3,.1139E4,980.,
     2 .60323E-5,77./
      DATA ATMZRO
     1             / 0.0,288.18,.12250E-2,.17894E-3,.10133E4,980.,
     2 .60317E-5, 77./
      DATA ATMMAX
     1            /50000.,282.66,.10829E-5,.17628E-3,.87858,965.42,
     2 .75023E-2, 0.0/
C
      IGO=0
      NBRNCH=1
      WATCOR=(1.-18./29.)/100.
C
C     READ OBJECT-TIME FORMAT
C
      READ(KRD,30)FMT
C
C     READ SCALE AND ADJUSTMENT FACTORS
C
```

```
      READ(KRD,40)SCALE
      DO 90 I=3,10
      IF(SCALE(I).EQ.0.0)  SCALE(I)=1.
   90 CONTINUE
C
C     READ ATMOSPHERE DATA SEQUENCE INDICIES
C
      READ(KRD,20)N1,N2,N3,N4,N5,N6,N7,N8
C
C     READ NUMBER OF ATMOSPHERE TABLE ENTRIES
C
      READ(KRD,10)NPVA
C
C     READ ATMOSPHERE TABLE ENTRIES, SEQUENCE AND ADJUST THEM TO THE
C     PROPER UNITS, AND WHERE APPROPRIATE COMPUTE THOSE ENTRIES NOT
C     PROVIDED IN THE INPUT.  ETA, GRV, AND SLM NEED NOT BE INPUT.
C     EITHER PRS OR RHZ (BUT NOT BOTH) NEED NOT BE INPUT
C
      DO 100 I=1,NPVA
      READ(KRD,FMT)AP
      ALT(I)=(AP(N1)+SCALE(1))*SCALE(3)
      ATP(I)=(AP(N2)+SCALE(2))*SCALE(4)
      PRS(I)=AP(N3)*SCALE(5)
      RHZ(I)=AP(N4)*SCALE(6)
      RLH(I)=AP(N5)*SCALE(7)
      ETA(I)=AP(N6)*SCALE(8)
      GRV(I)=AP(N7)*SCALE(9)
      SLM(I)=AP(N8)*SCALE(10)
C
C     ARE SUCCESSIVE TABLE ENTRIES IN ORDER OF INCREASING ALTITUDE-
C
      IF(I.EQ.1) GO TO 50
      IF(ALT(I).GT.ALT(I-1)) GO TO 50
   45 IRROR=-45
      GO TO 130
   50 IF(GRV(I).GT.0.0) GO TO 70
      GRV(I)=980.
   70 IF(ETA(I) .GT.0.0) GO TO 1070
      ETA(I)=1.458E-5*ATP(I)**1.5/(110.4+ATP(I))
 1070 IF(PRS(I).GT.0.0) GO TO 73
      IF(RHZ(I).GT.0.0) GO TO 72
   71 IRROR=-71
      GO TO 130
   72 ES= 6.11*(273./ATP(I))**5.13* EXP(25.*(ATP(I)-273. )/ATP(I))
      PRS(I)= 2867.9* RHZ(I)*ATP(I) +ES*RLH(I)*WATCOR
      GO TO 60
   73 IF(RHZ(I).GT.0.0) GO TO 60
      ES= 6.11*(273./ATP(I))**5.13* EXP(25.*(ATP(I)-273. )/ATP(I))
      RHZ(I)= (PRS(I)-ES*RLH(I)*WATCOR)/(2867.9*ATP(I))
   60 IF(SLM(I) .GT.0.0) GO TO 100
      SLM(I)=2.33239E-5*ATP(I)/PRS(I)
  100 CONTINUE
C
C     DETERMINE IF THE TABLE MUST BE EXPANDED TO 256 ENTRIES
C
  110 IF(NPVA-256)140,111,120
C
C 111 THE TABLES DO NOT NEED EXPANSION.  CHECK TO DETERMINE IF THE
C     TABLES HAVE THE PROPER BOUNDRIES.
C
```

```
  111 IF(ABS(ALT(1)+ 1000.).LE.1.) GO TO 113
  112 IRROR=-112
      GO TO 130
  113 IF(ABS(ALT(256)-5.E4).LE.50.) GO TO 115
  114 IRROR=-114
      GO TO 130
C
C 115 THE TABLES HAVE THE PROPER BOUNDRIES.  CHECK TO DETERMINE IF THE
C     ALTITUDE INTERVALS ARE ALL 200 METERS.
C
  115 DO 116 I=2,256
      IF(ABS(ALT(I)-ALT(I-1)-200.).GT.2.) GO TO 135
  116 CONTINUE
      GO TO 270
  120 IRROR=-120
  130 CALL ERROR(PROGRM,IRROR,KTR)
  135 CONTINUE
      GO TO (140,137),NBRNCH
  137 IRROR=-137
      GO TO 130
C
C 140 THE TABLES NEED EXPANSION OR INTERVAL ADJUSTMENT
C
  140 REWIND IRISE
C
C     DO THE TABLES BEGIN AT -1000 METERS-
C     IF NOT MAKE AN ENTRY AT -1000 METERS FROM THE ARDC STANDARD ATMOS.
C
      IF(ABS(ALT(1)+1000.) .GT. 1.) GO TO 150
      ALT(1)=-1000.
      GO TO 200
  150 WRITE(IRISE)ATMSUB
  160 IGO=IGO+1
C
C     DO THE TABLES HAVE AN ENTRY AT      0 METERS-
C     IF NOT MAKE AN ENTRY AT      0 METERS FROM THE ARDC STANDARD ATMOS.
C
      IF(ALT(1)    .LE. 0.001)GO TO 200
      WRITE(IRISE)ATMZRO
      IGO=IGO+1
C
C     STORE THE INPUT TABLES ON TAPE
C
  200 DO 210 I=1,NPVA
  210 WRITE(IRISE)ALT(I),ATP(I),RHZ(I),ETA(I),PRS(I),GRV(I),SLM(I),
     1 RLH(I)
C
C     DO THE TABLES HAVE AN ENTRY AT 50000 METERS-
C     IF NOT MAKE AN ENTRY AT 50000 METERS FROM THE ARDC STANDARD ATMOS.
C
      IF(ALT(NPVA) .GE. 5.E4) GO TO 220
      IF(ABS(ALT(NPVA)-5.E4).LE.50.)GO TO 220
      WRITE(IRISE)ATMMAX
      NPVA=NPVA+1
C
C     INITIALIZE FOR THE TABLES EXPANSION
C
  220 REWIND IRISE
      NPVA=NPVA+IGO
      IF(NPVA-256)222,222,221
```

```
  221 IRROR=-221
      GO TO 130
  222 DALT=200.
      NPV=1
      READ(IRISE)ALT(1),ATP(1),RHZ(1),ETA(1),PRS(1),GRV(1),SLM(1),
     1 RLH(1)
      A1=ALT(1)
      A2=ATP(1)
      A3=RHZ(1)
      A4=ETA(1)
      A5=PRS(1)
      A6=GRV(1)
      A7=SLM(1)
      A8=RLH(1)
C
C     EXPAND THE TABLES TO 256 ENTRIES IN 200 METERS INTERVALS IN
C     ALTITUDE FROM -1000 TO 50000 METERS BY LINEAR INTERPOLATION
C     FROM THE  INPUT TABLES
C
      DO 260 I=2,256
      ALT(I)=ALT(I-1)+DALT
  225 IF(A1.GE.ALT(I))GO TO 250
      IF(ALT(I)-A1 .LT. 2.) GO TO 250
      NPV=NPV+1
      IF(NPVA-NPV .GE.0)GO TO 240
  230 IRROR=-230
      GO TO 130
  240 READ(IRISE)A1,A2,A3,A4,A5,A6,A7,A8
      GO TO 225
  250 TERP=  DALT      /(A1-ALT(I-1))
      ATP(I)=ATP(I-1)+TERP*(A2-ATP(I-1))
      RHZ(I)=RHZ(I-1)+TERP*(A3-RHZ(I-1))
      ETA(I)=ETA(I-1)+TERP*(A4-ETA(I-1))
      PRS(I)=PRS(I-1)+TERP*(A5-PRS(I-1))
      GRV(I)=GRV(I-1)+TERP*(A6-GRV(I-1))
      SLM(I)=SLM(I-1)+TERP*(A7-SLM(I-1))
      RLH(I)=RLH(I-1)+TERP*(A8-RLH(I-1))
  260 CONTINUE
      NPVA=256
      NBRNCH=2
      GO TO 111
  270 RETURN
      END
$IBFTC COLX     LIST,DECK,M94/2
      SUBROUTINE COLLIS (
     1  T,V,RM,X,S,WT,EPS,NEQ,CF,CG,RAD,DNSTY,PVOL,P,KEQ)
C
C ***********************************************************************
C
C             COMPUTE COLLISION FUNCTIONS FOR PARTICLE COALESCENCE
C
C ***********************************************************************
C
      DIMENSION
     1  CF (40, 40), CG (40), CIN (40), RAD (40)
C
C ***********************************************************************
C ***********************************************************************
C
      FMU = 145.8E-8*T**1.5/(110.4+T)
```

```
      RA = RM/V*(1.+X)/(1.+X+S+WT)
      IF (EPS) 002, 002, 001
2     EPS = 1. E -4
1     CONTINUE
      FNU = FMU/RA
      FLAMDA = (FNU**3/EPS)**.25
      CONSTA=SQRT(EPS/FNU)
      GO TO (011, 011, 039), KEQ
  011 CONSTB = EPS ** 0.33333333
      DO 20 I = 1, NEQ
      DO 20 J = I, NEQ
      IF(RAD(I)+RAD(J)-FLAMDA)21, 21, 22
21    CF(I,J) = CONSTA*(RAD(I)+RAD(J))
      GO TO 20
22    CF(I,J) = CONSTB*(RAD(I)+RAD(J))**.33333333
20    CF(J,I) = CF(I,J)
      TESTA=FLAMDA*SQRT(RA/DNSTY)
      TESTB = FLAMDA*(RA/DNSTY)**.25
      TESTC = 28.8*TESTB
      CONSTA = .22222222*DNSTY/RA*(EPS**3/FNU**5)**.25
      CONSTB=.22222222*SQRT(EPS/FNU*DNSTY/RA)
      CONSTC = .22222222*(EPS*DNSTY/RA)**.44444444/FNU**.33333333
      CONSTD = (EPS*DNSTY/RA)**.33333333
      DO 30 J = 1, NEQ
      IF(RAD(J)-TESTA) 31, 31,  32
31    CIN(J) = CONSTA*RAD(J)**2
      GO TO 30
32    IF(RAD(J)-TESTB) 33, 33, 34
33    CIN(J) = CONSTB*RAD(J)
      GO TO 30
34    IF(RAD(J)-TESTC)35, 35,36
35    CIN(J) = CONSTC*RAD(J)**.77777778
      GO TO 30
36    CIN(J) = CONSTD*RAD(J)**.33333333
30    CONTINUE
  039 DO 40 J = 1, NEQ
40    CG(J) = FSPEED(J,FMU,RA,RAD,PVOL,DNSTY)
      GO TO (041, 041, 200), KEQ
  041 CONSTA = T/FMU*.92E-23
      CONSTB = T/P*2.33E-5*CONSTA
      CONSTC = 3.1415927
      DO 50 I = 1, NEQ
      DO 50 J = I, NEQ
      RR = RAD(I) + RAD(J)
      RSUM = .28*CF(I,J)**2+3.*(CIN(I)-CIN(J))**2+(CG(I)-CG(J))**2
      CF(I,J) = RR*(
     1     CONSTA*RR/(RAD(I)*RAD(J))
     2   +    CONSTB*(1./RAD(I)**2 + 1./ RAD(J)**2)
     3+RR*CONSTC*SQRT(RSUM)
     4                     )
50    CF(J,I) = CF(I,J)
  200 RETURN
      END
$IBFTC CPFRX    LIST,DECK,M94/2
      SUBROUTINE CPFR (
     1  AMSS, CG, CMLR, DNSTY, DST, KTR, MWYA, NEQ, PVOL, S, SMSS,
     2  R, RFM, V, WT, Y, ZMSS, ZMZZ)
C
C ******************************************************************
C
```

```
C     CPFR COMPUTES PARTICLE FALLOUT RATE
C
C ***********************************************************************
C
        ENSION
     1  CG (40), SMSS (40), Y (40), ZMSS (40)
C
C ***********************************************************************
C
  903 FORMAT (1H1//////////
     1  20X30HNEGATIVE PARTICLE DENSITY                          //////)
C
C ***********************************************************************
C ***********************************************************************
C
C                                      TEST FOR IMPOSSIBLE PARTICLE
          DO 901 J = 1, NEQ
          IF(Y(J)) 902, 901, 901
901       CONTINUE
          GO TO 900
  902 WRITE(KTR,903)
      MWYA = 3
      GO TO 008
900       CONTINUE
      AMSS = 0.0
          CMLR = 0.0
      ZMZZ = 0.0
      A = 3.1415927 * R ** 2 * DST
      B = DNSTY * PVOL * (S / (S + WT))
      DO 850 J = 1, NEQ
      C = 2.0 ** (J - 1)
      D = A * CG (J)
      BMSS = B * C * V * Y (J)
      SMSS (J) = SMSS (J) + D * BMSS / V
      ZMSS (J) = SMSS (J) + BMSS * (1.0-D/V)
      AMSS = AMSS + ZMSS (J)
      ZMZZ = ZMZZ + SMSS (J)
      CMLR = CMLR + C * D * Y (J)
  850 Y(J)=Y(J)*(1.-D/V)
      CMLR = CMLR / DST * DNSTY * PVOL
      ZMSS (NEQ) = ZMSS (NEQ) + RFM - AMSS
      AMSS = AMSS / RFM
      ZMZZ = ZMZZ / RFM
      DO 007 NP = 1, NEQ
  007 ZMSS (NP) = ZMSS (NP) / RFM
  008 RETURN
      END
$IBFTC CPVX    LIST,BECK,M94/2
      SUBROUTINE CPV (
     1  ALT, ATP, B0, B1, B2, CMEAN, CMLR, CSIGMA, CG,
     1  D0, D1, D2, DNSTY, EK, EPS, F, HLR, HOB, KEQ,
     2  KS, MWYA, N, NEQ, NNN, NPVA, DIAM, P, PHI,
     3  PRS, SD, PVOL, QI, R, RFD, RFM, RLH,
     4  RM, RMIN, RZT, S, SALTD, SALTM, SMALLT, SMSS, SZRO,
     5  T, TE, TF, TR, TSALT, TZR, U, V, VZRO, W, WT, X,
     6 Y,Z,ZBRSTZ,ZLMT,IDISTR,RAD,ZMSS,RF0,RF1,RF2,TRQ)
C
C ***********************************************************************
C     22 AUGUST 1967
C
```

```
C  INITIAL CLOUD AND PARTICLE VARIABLES, AND COMPUTATION CONTROLS
C   GENERALIZED LAND SURFACE BURST
C
C **********************************************************************
C
      DIMENSION
    1  ALT (260),ATP (260),CG (40), PRS (260),RLH (260),SMSS (40),
    2  Y (40),RAD( 40) ,ZMSS( 40)
C
C **********************************************************************
           CMLR = 0.0
C
C **********************************************************************
      EK = 0.0
      EPS = 0.0
      IF (KEQ) 001, 001, 011
  001 KEQ = 3
  011 MWYA = 1
      KS=2
      IF (NEQ) 002, 002, 003
  002 NEQ = 40
  003 CONTINUE
       N=1
      NNN = 10 + NEQ
      RMIN = RMIN *1.0E-6
       RZT=-1.0
      SALTD = 1.0
      SALTM = 0.0
      SMALLT = 0.0
      TSALT=TZR
      T = TZR
      TF = 273.0
      TR = TZR
      U = 0.0
      WT = 0.0
      XE = 0.0
C     COMPUTE FRACTION OF DETONATION ENERGY YIELD IN CLOUD
C     AT INITIAL TIME
      SCLHOB= ABS( HOB*W**(-1.0/3.4))
      IF(HOB)5,6,6
    5 HSCL= ((112.5+ 0.755*SCLHOB- 9.6E-6*SCLHOB**3- 9.11E-12*SCLHOB**5)
    1 **2)*( 32.7+0.851*SCLHOB- 2.52E-5*SCLHOB**3+ 1.78E-10*SCLHOB**5)/
    2 (32.7*112.5**2)
      GO TO 7
    6 HSCL=  (180.-SCLHOB)**2*(360.+SCLHOB)/(360.*180.**2)
    7 F = HSCL* (0.44*W**(-.06)-0.147)-.02*ALOG10(W)+.243
      IF(ICISTR)802,802,801
  802 CSIGMA=      ALOG(SD)
      CMEAN =          ALOG (0.000001 * DIAM)
    1  + 3.0 * CSIGMA ** 2
      IF (RMIN) 008, 008, 009
  008 RMIN = 0.5*EXP  (CMEAN - 2.33 * CSIGMA)
  009 CONTINUE
      CALL PARDIS (
    1  NEQ, CMEAN - 0.69315, CSIGMA, Y, RMIN)
      CMEAN = 1.0E6 * EXP(CMEAN)
      CSIGMA = SD
  801 DO 61 J=1,NEQ
      ZMSS(J)=Y(J)
      SMSS (J) = 0.0
```

```
 061 CG (J) = 0.0                                                      CPVX  73
     MROUT = 0                                                         CPVX  74
     Z= 0.3048*(ZBRST7+ HOB+ 145.0*W**0.4)                             CPVX  75
 102  MROUT = MROUT+1                                                  CPVX  76
     CALL TRPL (                                                       CPVX  77
    1    Z, NPVA, ALT, ATP, TE)                                        CPVX  78
     CALL TRPL (                                                       CPVX  79
    1    Z, NPVA, ALT, PRS, P)                                         CPVX  80
     P = P * 100.0                                                     CPVX  81
     CALL TRPL (                                                       CPVX  82
    1  Z, NPVA, ALT, RLH, HLR)                                         CPVX  83
     SOILHT = RFM*(RF0 *(TRQ- TE)+ RF1*(TRQ**2- TE**2)/2. +            CPVX  84
    1 RF2*( TRQ**3- TE**3)/3.0)                                        CPVX  85
     RMAD = PHI *(F * W * 4.18E12 -SOILHT)/                            CPVX  86
    1  (B0 * (T - TE) + B1 / 2.0 * (T * T - TE * TE) +                 CPVX  87
    2  B2 / 3.0 * (T * T * T - TE * TE * TE))                          CPVX  88
     RMWD = (1.0 - PHI) *(F * W * 4.18E12 -SOILHT)/                    CPVX  89
    1  (D0 * (T - TE) + D1 / 2.0 * (T * T - TE * TE) +                 CPVX  90
    2  D2 / 3.0 * (T * T * T - TE * TE * TE) + 2500000.0)              CPVX  91
     X = RMWD / RMAD                                                   CPVX  92
     V = (RMAD + RMWD) * 287.0 * T * (1.0 + 29.0 * X / 18.0) /         CPVX  93
    1  (P * (1.0 + X))                                                 CPVX  94
                 VZRO = V                                              CPVX  95
      R=(3.*V/12.5663706)**.333333333                                  CPVX  96
      RM=RMAD+RMWD                                                     CPVX  97
          RM = RM + RFM                                                CPVX  98
          PVOL = 4.1887902*RMIN**3                                     CPVX  99
712       S = (RFM+SALTM)/RMAD                                         CPVX 100
     DNSTY = RFD*SALTD*(RFM+SALTM)/(SALTD*RFM+RFD*SALTM)               CPVX 101
     PVOL = PVOL*(RFM*SALTD+RFD*SALTM)/(RFM*SALTD+.1*RFD*SALTM)        CPVX 102
 713  GO TO (916,716),MROUT                                            CPVX 103
 716      Q =S/(1.+X+S)*RM/(V*PVOL*DNSTY)                              CPVX 104
          Y(1) = Y(1)*Q                                                CPVX 105
          QQ = 1.                                                      CPVX 106
     RAD(1) = .62035*PVOL**.33333333                                   CPVX 107
          DO 915 J = 2, NEQ                                            CPVX 108
     RAD(J) = RAD(J-1)*1.2599211                                       CPVX 109
          QQ = QQ + QQ                                                 CPVX 110
915       Y(J) = Y(J)*Q/QQ                                             CPVX 111
 916          IF(TR-T) 709, 7130, 7130                                 CPVX 112
709           S = 0.                                                   CPVX 113
7130      CONTINUE                                                     CPVX 114
     SZRO = S                                                          CPVX 115
     QI=.5*(RM-RFM)*T*(18.+29.*X)*(1.+XE)/(TE*(18.+29.*XE)*(1.+X))     CPVX 116
     QI= QI*(1.+X)/(1.+X+S)                                            CPVX 117
     Z = 0.3048 * (ZBRSTZ + HOB) + R                                   CPVX 118
     GO TO (102,106),MROUT                                             CPVX 119
C                                      UPPER LIMIT FOR Z TO PREVENT    CPVX 120
C                                      PROGRAM RUNAWAY                 CPVX 121
  106 ZLMT = 10000.0 * W ** 0.25                                       CPVX 122
     RETURN                                                            CPVX 123
     END                                                               CPVX 124
$IBFTC CRMX    LIST,DECK,M94/2                                         CRMX   0
     SUBROUTINE CRM (                                                  CRMX   1
    1  ALT, ATP, CF, CMEAN, CSIGMA, CX, HOB, KCLD, KEQ, KTR, MCX,      CRMX   2
    2  NEQ, NPVA, DIAM, PRS, SD, RFD, RFM, RLH, RMIN,RAD,              CRMX   3
    3  THZR,TRQ,W,TZR,ZBRSTZ,ZT,Y,IDISTR,ZMSS,DNSTY,SLDTMP)            CRMX   4
C                                                                      CRMX   5
C *********************************************************************CRMX   6
C     21 JUNE 1967                                                     CRMX   7
```

```
C                                                                       CRMX
C     CRM COMPUTES CLOUD RISE AND EXPANSION FOR LAND SURFACE            CRMX
C     DETONATIONS                                                       CRMX
C                                                                       CRMX
C **********************************************************************CRMX
C                                                                       CRMX
      DIMENSION                                                         CRMX
     1  ALT (260),ATP (260),CG (40), CX (10, 90), PRS (260),            CRMX
     2  RAD (40), FLH (260),SMSS (40), Y (40), ZMSS (40)                CRMX
      DIMENSION CF (40, 40)                                             CRMX
  521 FORMAT(1H1,9X, 48HPARTICLE SIZE-MASS FREQUENCY DISTRIBUTION AT THECRMX
     1A6, 24H OF THE CRM CALCULATIONS/10X,18H(RADIUS IN METERS)//       CRMX
     2                                   20X, 6HRADIUS,7X, 13HMASS FRACTIOCRMX
     3N//(11X,I3, 3X,E12.5,4X,E12.5))                                   CRMX
  532 FORMAT(1H0,9X, 76HFRACTION OF THE DETONATION ENERGY YIELD IN THE CCRMX
     1LOUD AT THE INITIAL TIME IS E12.5)                                CRMX
C                                                                       CRMX
C **********************************************************************CRMX
C **********************************************************************CRMX
C                                                                       CRMX
      DATA WORD1,WORD2/6H START,6H  END /                               CRMX
      DO 333 J = 1, 40                                                  CRMX
      DO 333 I = 1, 40                                                  CRMX
  333 CF (I, J) = 0.0                                                   CRMX
C*************************************** EMPIRICAL CONSTANTS            CRMX
      DATA     B0      , B1      , B2      , CHANGE  , C3      , D0     CRMX
     1      / 1091.0  , 0.1328  , 0.0     , 30.0    , 0.175   , 1910.0 /,  CRMX
     2        D1      , D2      , DST0    , DST1    , DST2    , PHI     CRMX
     3      / 0.0349  ,0.000313, 0.0625  , 0.5     , 5.0     , 1.0    /,  CRMX
     4        RL      , RF0     , RF1     , RF2     , RK2     , RK3     CRMX
     5      / 0.2     , 750.    , 0.0     , 0.0     , 0.1     , 1.0    /   CRMX
C*************************************** INITIAL VARIABLES AND CONTROLSCRMX
      DST = DST0                                                        CRMX
      CALL CPV (                                                        CRMX
     1  ALT, ATP, B0, B1, B2, CMEAN, CMLR, CSIGMA, CG,                  CRMX
     1  D0, D1, D2, DNSTY, EK, EPS, F, HLR, HOB, KFQ,                   CRMX
     2  KS, MWYA, N, NEQ, NNN, NPVA, DIAM, P, PHI,                      CRMX
     3  PRS, SD, PVOL, QI, R, RFD, RFM, RLH,                            CRMX
     4  RM, RMIN, RZT, S, SALTD, SALTM, SMALLT, SMSS, SZRO,             CRMX
     5  T, TE, TF, TR, TSALT, TZR, U, V, VZRO, W, WT, X,                CRMX
     6 Y,Z,ZBRST7,ZLMT,IDISTR,RAD,ZMSS,RF0,RF1,RF2,THQ)                 CRMX
      WRITE(KTR,521) WORD1,(J,RAD(J),ZMSS(J),J=1,NEQ)                   CRMX
      WRITE(KTR,532)F                                                   CRMX
      IF( KEQ-1)3001,3001,3002                                          CRMX
 3001 KEQE=1                                                            CRMX
      GO TO 35                                                          CRMX
 3002 KEQE=2                                                            CRMX
      GO TO 35                                                          CRMX
C*************************************** CLOUD COMPUTATION              CRMX
  008 CALL CXPN (                                                       CRMX
     1  CX, MCX, MWYA, R, RZT, SMALLT, T, TM2R, W, Z,KTR,RA)            CRMX
      GO TO (724, 724, 148), MWYA                                       CRMX
  148 CALL CRMW (                                                       CRMX
     1  CMEAN, CSIGMA, CX, KTR, MCX)                                    CRMX
      GO TO(1148,2148),KEQE                                             CRMX
 1148 WRITE(KTR,521) WORD2,(J,RAD(J),ZMSS(J),J=1,NEQ)                   CRMX
 2148 RETURN                                                            CRMX
C                                       UPDATE PARTICLE VOLUMES         CRMX
  724 CALL UPVCS (                                                      CRMX
     1  DNSTY, KS, NEQ, PVOL, RFD, RFM, RM, S, SALTD,                   CRMX
```

```
     2  SALTM, SZRO, T, TR, TSALT, V, VZRO, X, Y)
C                                              STORE TIME STEP VARIABLES
      CALL RSTR (
     1  DST, EK, 1, N, NEQ, PVOL, RM, S, SAVE, SMALLT, SMSS,
     2  T, U, V, WT, X, Y, Z)
C                                              TAKE A RUNGE-KUTTA STEP
    9 VTEMPY=V
      CALL RKGILL (
     1  ALT, ATP, B0, B1, B2, CF, CG, CMLR, C3, DNSTY, DST, DU, DWT,
     2  D0, D1, D2, ED, EK, EPS, HLR, KEQ, N, NEQ, NNN, NPVA,
     3  P, PRS, PVOL, QI, RAD, RFD, RFM, RF0, RF1, RF2,
     4  RK2, RK3, RL, RLH, RM, RZT,S, SALTD, SALTM, T, TE,
     5  TF, TR, TRQ, TSALT, U, V, WT, X, Y, Z)
C     ADJUST THE IN-CLOUD PARTICLE NUMBER DENSITY
      DO  86 J=1,NEQ
   86 Y(J)=Y(J)*VTEMPY/V
C                                              ACCUMULATE CLOUD TIME
      SMALLT = SMALLT + DST
      IF (SMALLT - 1.0) 008, 087, 088
  087  DST=DST1
C                                              COMPUTE HORIZONTAL RADIUS
  088  IF(RZT)888,89,89
  089  R=SQRT (3.*V/(RZT*12.5663706))
       GO TO 35
  888  R=(3.*V/12.5663706)**.333333333
  035 PW=P*X*29./(18. +29.*X)
      ES=611.* (T/273.)**(-5.13)*EXP ((25.*(T-273.))/T)
      RA=RM/V*(1.+X)/(1.+X+S+WT)
  149 GO TO (150, 1531, 1531), N
C                                              WET OR DRY EQUATIONS
  150  IF (ES-PW) 152,152,1531
C                                              RESTART AT LAST TIME STEP
  152 CALL RSTR (
     1  DST, EK, 2, N, NEQ, PVOL, RM, S, SAVE, SMALLT, SMSS,
     2  T, U, V, WT, X, Y, Z)
      GO TO 009
C                                              COMPUTE PARTICLE FALLOUT RATE
 1531 CALL CPFR (
     1  AMSS, CG, CMLR, DNSTY, DST, KTR, MWYA, NEQ, PVOL, S, SMSS,
     2  R, RFM, V, WT, Y, ZMSS, ZMZZ)
      GO TO (084, 084, 008), MWYA
C                                              COMPUTE PARTICLE PARAMETERS
  084 IF(IDISTR)901,901,902
  901 CALL DSTR(
     1  CMEAN, CSIGMA,DST, KEQ, NEQ, RMIN, SLDTMP, T, ZMSS)
  902 GO TO (1146,146),KCLD
C                                              DEBUG PRINTER
  146 CALL DBG (
     1  AMSS, CG, CMEAN, CSIGMA, ED, EK, EPS, ES,
     2  HLR, KTR, NEQ, P, PVOL, CMLR, ZMZZ,
     2  PW, R, RAD, RM, S, SMALLT, T, TE, U, V, WT, X, Y, Z, ZMSS)
C                                              TEST COMPUTATION STATUS
 1146 CALL DCSN (
     1  CHANGE, DST, DST2, DU, DWT, ES, KCLD, K
     2  MWYA, N, PW, R, RZT, SAVE, SMALLT,
     3  T, U, WT, Z, ZLMT, ZT)
      GO TO 008
      END
$IBFTC CRMWX   LIST,DECK,M94/2
      SUBROUTINE CRMW (
```

```
     1  CMEAN, CSIGMA, CX, KTR, MCX)                                     CRMW
C                                                                       CRMW
C *********************************************************************CRMW
C                                                                       CRMW
C      CRMW PRINTS SUMMARY OF OUTPUT OF THE CLOUD RISE MODULE.          CRMW
C                                                                       CRMW
C *********************************************************************CRMW
C                                                                       CRMW
      DIMENSION                                                         CRMW
     1  CX (10, 90)                                                     CRMW
C                                                                       CRMW
C *********************************************************************CRMW
C                                                                       CRMW
  008 FORMAT (1H1 /////                                                 CRMW
     1  10X41HCLOUD RISE AND EXPANSION HISTORY TABLE CX//1X)            CRMW
  010 FORMAT (                                                          CRMW
     1 15X,75HPARAMETERS FOR THE LOGNORMAL PARTICLE DIAMETER-MASS FREQUECRMW
     1NCY DISTRIBUTION-//    20X,17HGEOMETRIC MEAN = 1PE10.3,           CRMW
     1 9H MICRONS,,  3X, 31HGEOMETRIC STANDARD DEVIATION = 1PE10.3///)  CRMW
   20 FORMAT(                                                           CRMW
     1  49X19HCLOUD HISTORY TABLE//                                     CRMW
     1  5X5(3X5HCLOUD, 3X), 3X4HBASE, 8X3HTOP, 7X6HRADIAL,              CRMW
     2  3X11HTEMPERATURE,4X, 3HGAS/                                     CRMW
     3  8X4HTIME, 5X8HINTERVAL, 5X4HBASE, 8X3HTOP, 6X6HRADIUS,          CRMW
     4  3X3(3X4HRATE, 4X), 14X, 7HDENSITY/                              CRMW
     5  5X2(3X5H(SEC), 3X), 3(4X3H(M), 4X), 3(2X7H(M/SEC), 2X),4X,      CRMW
     6  3H(K),5X10H (KG/M**3)// (1X12, 1H), 1X, 1P10E11.3))             CRMW
C                                                                       CRMW
C *********************************************************************CRMW
C *********************************************************************CRMW
C                                                                       CRMW
      WRITE(KTR,008)                                                    CRMW
      WRITE(KTR,010)                                                    CRMW
     1  CMEAN, CSIGMA                                                   CRMW
      WRITE(KTR,20)                                                     CRMW
     1  (J, (CX (I, J), I = 1,10),     J = 1, MCX)                      CRMW
      RETURN                                                            CRMW
      END                                                               CRMW
$IBFTC CXPX    LIST,DECK,M94/2                                          CXPX
      SUBROUTINE CXPN (                                                 CXPX
     1  CX, MCX, MWYA, R, RZT, SMALLT, T, TMZR, W, Z,KTR,RA)            CXPX
C                                                                       CXPX
C *********************************************************************CXPX
C                                                                       CXPX
C      CXPN TABULATES THE CLOUD RISE AND EXPANSION TABLE FOR GLFM       CXPX
C      AND TESTS RATE OF RADIAL EXPANSION TO END CRM COMPUTATION. SEE 143CXPX
C                                                                       CXPX
C *********************************************************************CXPX
C                                                                       CXPX
      DIMENSION                                                         CXPX
     1  CX (10, 90)                                                     CXPX
C                                                                       CXPX
 5000 FORMAT(1H1, 9X, 46HCLOUD RISE IS TERMINATED IN CXPN AT STATEMENT ICXPX
     14, 8H BY THE A6, 7H SWITCH///)                                    CXPX
C                                                                       CXPX
      DATA WORD1,WORD2/6HR RATE,6H MCX  /                               CXPX
C                                                                       CXPX
C *********************************************************************CXPX
C *********************************************************************CXPX
C                                                                       CXPX
```

```
      GO TO (002, 020, 040), MWYA
  002 DO 004 MJ = 1, 90
      DO 004 MI = 1, 10
  004 CX (MI, MJ) = 0.0
      MCX = 1
      MWYA = 2
      DLTM = 0.0
      TSTM = SMALLT
      TSRD=EXP(-0.05912*ALOG(W)-7.013)
      ZBFR = Z
      GO TO 040
  020 IF (SMALLT - TSTM) 070, 040, 040
  040 CX (1, MCX) = SMALLT
      IF (Z - ZBFR) 041, 042, 042
  041 ZA = ZBFR
      GO TO 043
  042 ZA = Z
  043 CX (5, MCX) = R
      CX (9, MCX) = T
      CX(10,MCX)=RA
C                                      TEST TO END CRM COMPUTATION
      IF (MCX - 3) 343, 343, 143
  143 TSTR=ABS(ALOG(CX(5,MCX))-ALOG(CX(5,MCX-1)))
      TSTR = TSTR / (CX (1, MCX) - CX (1, MCX - 1))
      IF (TSTR - TSRD) 243, 343, 343
  243 MWYA = 3
      NSTAT=243
      WRITE(KTR,5000)NSTAT,WORD1
  343 IF (RZT) 044, 048, 048
  044 CX (3, MCX) = ZA - R
      CX (4, MCX) = ZA + R
      GO TO 060
  048 CX (3, MCX) = ZA - RZT
      CX (4, MCX) = ZA + RZT
  060 MCX = MCX + 1
C                                      CHECK CAPACITY OF ARRAY CX
      IF (MCX - 90) 062, 062, 061
  061 MWYA = 3
      NSTAT=61
      WRITE(KTR,5000)NSTAT,WORD2
  062 CXM = MCX
      DLTM = DLTM + CXM * .084946
      TSTM = TSTM + DLTM
      IF (Z - ZBFR) 068, 068, 067
  067 ZBFR = Z
  068 GO TO (070, 070, 100), MWYA
  070 RETURN
C                                      COMPLETE OUTPUT CX TABLE
  100 MCX = MCX - 1
      IF (CX (1, MCX - 1) - CX (1, MCX)) 102, 100, 102
  102 DO 104 MK = 2, MCX
C                                      COMPUTE TIME INTERVAL LENGTH
      CX (2, MK - 1) = CX (1, MK) - CX (1, MK - 1)
C                                      COMPUTE VERTICAL RATES
      CX (6, MK - 1) = (CX (3, MK) - CX (3, MK - 1)) / CX (2, MK - 1)
      CX (7, MK-1) = (CX (4, MK) - CX(4, MK-1)) / CX (2, MK - 1)
C                                      COMPUTE RADIAL RATE
  104 CX (8, MK - 1) = (CX (5, MK) - CX (5, MK - 1)) / CX (2, MK - 1)
      DO 106 ML = 1, MCX
  106 CX (1, ML) = CX (1, ML) + TMZR
```

```
      GO TO 070
      END
$IBFTC DBGX    LIST,DECK,M94/2
      SUBROUTINE DBG (
     1  AMSS, CG, CHEAN, CSIGMA, ED, EK, EPS, ES,
     2  HLR, KTR, NEQ, P, PVOL, CMLR, ZMZZ,
     2  PW, R, RAD, RM, S, SMALLT, T, TE, U, V, WT, X, Y, Z, ZMSS)
C
C **********************************************************************
C
C     DBG IS DEBUG PRINTER
C
C **********************************************************************
C
      DIMENSION
     1  CG (40), RAD (40), Y (40), ZMSS (40)
C
C **********************************************************************
C
  016 FORMAT (1H0 /
     1  3X1P9E13.4 /
     2  (10X1H*, 5X8E13.4))
  017 FORMAT (
     1  16X2(5X3HRAD,11X2HCG,11X1HY,11X3HZMS,5X) /
     2  (16X1P8E13.4))
  099 FORMAT (1H0 / 49X17HCLOUD DEBUG PRINT //
     1  9X2HST, 11X1HU, 12X1HX, 12X1HT, 12X1HR, 12X1HZ, 12X2HEK,
     2  11X1HV, 12X2HWT / 10X1H*, 11X2HTE, 11X2HRM, 11X2HES,
     3  11X1HP, 12X2HPW, 11X2HED, 10X3HRLH, 11X1HS/
     4  10X1H*, 10X3HEPS, 10X4HPVOL, 9X4HMEAN, 8X5HSIGMA, 9X4HAMSS,
     5  9X4HCMLR, 9X4HZMZZ ///)
C
C **********************************************************************
C **********************************************************************
C
      IF (AMOD (SMALLT, 13.0)) 2146, 1149, 2146
 1149 WRITE(KTR,099)
 2146 IF (SMALLT) 1146, 1146, 3146
 3146 IF(SMALLT-AINT(SMALLT))149,4146,149
 4146 IF(AMOD(SMALLT,2.0))1146,149,1146
 1146 WRITE(KTR,016)
     1  SMALLT, U, X, T, R, Z, EK, V, WT,
     2  TE, RM, ES, P, PW, ED, HLR, S,
     3  EPS, PVOL, CMEAN, CSIGMA, AMSS, CMLR, ZMZZ
      WRITE(KTR,017)
     1  (RAD (I), CG (I), Y (I), ZMSS (I),
     2  RAD (I + 1), CG (I + 1), Y (I + 1), ZMSS (I + 1),
     3  I = 1, NEQ, 2)
  149 RETURN
      END
$IBFTC DCSX    LIST,DECK,M94/2
      SUBROUTINE DCSN (
     1  CHANGE, DST, DST2, DU, DWT, ES, KCLD, KTR,
     2  MWYA, N, PW, R, RZT, SAVE, SMALLT,
     3  T,U,WT,Z,ZLMT,ZT)
C
C **********************************************************************
C
C     DCSN DETERMINES AT THE END OF EACH TIME STEP WHETHER TO
C     CONTINUE THE CRM COMPUTATION
```

```
C
C ****************************************************************************
C
  052  FORMAT(24H SWITCH TO ELLIPSE, R=RH)
  066 FORMAT(14H0SWITCH TO DRY)
  077  FORMAT(14H0SWITCH TO WET)
  088 FORMAT(1H1, 9X, 46HCLOUD RISE IS TERMINATED IN DCSN AT STATEMENT I
     14, 8H BY THE A6, 7H SWITCH///)
C
      DATA WORD1,WORD2,WORD3,WORD4 /6H TEMP ,6H DU,U ,6H ZLMT ,6HR.LT.1/
C
C ****************************************************************************
C ****************************************************************************
C
      GO TO (151,154,1531),N
 1531 IF(ES-PW)041,041,008
  041  DST=SAVE
       N=2
      GO TO (151, 1041), KCLD
 1041 WRITE(KTR,077)
       GO TO 151
C
C 154 SHOULD WE SWITCH TO DRY MODE-
C        NO TO 151
C
  154 IF(ES-PW.LE.0.0) GO TO 151
      N=1
      GO TO(151,152),KCLD
  152 WRITE(KTR, 66)
C                                                IF RZT IS POSITIVE,
C                                                CLOUD IS IN ELLIPSOIDAL MODE
  151  IF(RZT)50,1511,1511
C                                                CLOUD IN ELLIPSOIDAL MODE
C                                                IF Z + R IS GREATER THAN ZT
  050 IF(Z + R - ZT)  1511, 51, 51
  051  RZT=R
      GO TO (1511, 1051), KCLD
 1051 WRITE(KTR,052)
 1511 IF (SMALLT - CHANGE) 014, 015, 014
  015  DST=DST2
  014 IF(ABS(T)-10.)114,20,20
  114 NSTAT=14
      WORD=WORD1
      GO TO 1
  020  IF(R-1.) 120,21,21
  120 NSTAT=20
      WORD=WORD4
      GO TO 1
  021 IF (SMALLT - 10.0) 013, 210, 210
  210 IF(ABS(DU)*DST-0.1)211,013,013
  211 IF(ABS(U)-0.1)1211,13,13
 1211 NSTAT=211
      WORD=WORD2
      GO TO 1
  013 IF (Z - ZLMT) 008, 008, 113
  113 NSTAT=13
      WORD=WORD3
C                                                COMPLETE CX TABLE
  008 NWYA = 3
      WRITE(KTR,088)NSTAT,WORD
```

```
  008 RETURN
      END
$IBFTC DERI    LIST,DECK,M94/2
      SUBROUTINE DERIV (
     1  ALT, ATP, B0, B1, B2, CF, CG, CMLR, C3, DEK, DNSTY,
     2  DPVOL, DRM, DS, DT, DU, DV, DWT, DX, DY, DZ,
     3  D0, D1, D2, ED, EK, EPS, HLR, KEQ, N, NEQ, NPVA,
     4  P, PRS, PVOL, QI, RAD, RFD, RFM, RF0, RF1, RF2, RK2, RK3,
     5  RL, RLH, RM, RZT, S, SALTD, SALTM, T, TE, TF, TR,
     6  TRQ, TSALT, U, V, WT, X, Y, Z)
C
C ***********************************************************************
C
C     VERSION OF DERIV TO BE USED WITH RKGILL
C
C ***********************************************************************
C
      DIMENSION
     1  ALT (260),ATP (260),CG (40), DY (40),
     2  PRS (260),RAD (40), RLH (260),Y (40)
      DIMENSION CF (40, 40)
C
C ***********************************************************************
C ***********************************************************************
C
      WATERD = 1.E3
      DZ = 0
C                                COMPUTE TE AND P
      CALL TRPL (
     1  Z, NPVA, ALT, ATP, TE)
      CALL TRPL (
     1  Z, NPVA, ALT, PRS, P)
      P = P * 100.0
C                                                    FIND RELATIVE
C                                                         HUMIDITY
      CALL TRPL (
     1  Z, NPVA, ALT, RLH, HLR)
  036 XE = 109.98 * HLR * (TE / 273.0) ** (-5.13) *
     1EXP((25.0*(TE-273.0))/TE)/(P*29.0)
38    CPAI=B0*(T-TE)+B1/2.*(T*T-TE*TE)+B2/3.* (T*T*T-TE*TE*TE)
       CPW=D0 + D1*T + D2*T*T
       CP=(B0+B1*T+B2* T*T  + X*CPW)/(X+1.)
      CR = CP*(1.+X)/(1.+X+S+WT)
      IF(TRQ-T)380, 381, 381
381   CR = CR +
     1                        (RF0+T*(RF1+RF2*T))*(S+WT)/(1.+X+S+WT)
380   CONTINUE
      QXE=( 1.+XE)/(1.+29.*XE/18.)
      QX=(1.+29.*X/18.)/(1.+X)
      QT=T/TE
       IF(RZT)35,70,70
35     R=(3.*V/12.5663706)**.333333333
       SV=3./R
      RLL = R
       GO TO 49
   70 R=SQRT(3.*V/(RZT*12.5663706))
      ECC=SQRT(R*R-RZT*RZT)/R+1.0E-15
      SV=3.1415926*(2.*R*R+RZT*RZT*ALOG((1.+ECC)/(1.-ECC))/ECC)/V
      RLL = RZT
  049 EPS = C3 * (2. * EK) ** 1.5 / RLL
```

```
      Q7=AMAX1(ABS(U),SQRT(2.0*EK))
      R2 = RLL
   61 DRM      = SV * RM * Q7* RD
      DRME =DRM
      DRM = DRM * CHLR
      QQ = QT*QX*QXE*(1.+X+WT)/(1.+X+S+WT)
621   DU = (9.8*(QT*QX*(1.+X)/(1.+X+S+WT)*QXE-1.)
     2                          -(QQ+Q7      *2.*RK2/R2 + DRM    /RM)*U)*
     3 (PM+Q)*(1.-RK3))/(RM*Q))
      GO TO (100, 101, 100), N
100   DX = - (1.+X+S)/(1.+XE)*(X-XE)*DRME/RM
      DT = -((QT*QX*9.8*U*QXE-EPS)*(1.+X)/(1.+X+S+WT)+CPAI*DRME/RM)/CR
C                                           RK2 IS M2, RL IS LAMBDA, RM IS M
      DV = V*(DRME/RM*(1.+X+S+WT)/(1.+X)+DT/T+9.8*U/(287.*QXE*TE)
     1            +(29./18.-1.)/((1.+X)**2*QX)*DX)
            WT = 0.
            DWT = 0.
            DPVOL = 0.0
            IF(T-TSALT) 701, 701, 702
702         DNSTY = RFD*SALTD*(RFM+.1*SALTM)/(RFD*.1*SALTM+SALTD*RFM)
            GO TO 555
701         DNSTY = RFD*SALTD*(RFM+SALTM)/(RFD*SALTM+RFM*SALTD)
       GO TO 555
C  THIS IS THE WET PART
101     Q1 = 1. + X*29./18.
        IF(T-TF)102,103,103
102     CL=2.83E6
        GO TO 104
103     CL=2.5E6
104     Q2 = CL*X/( 287.*T )
        Q3 = 18.*Q2/( T*29. )
        Q4 = 1. + Q2
        Q5 = 1.+ CL*Q3/CP
       Q6 = (CL * (X - XE) / CP * T - TE) * (1.0 + X + S + WT) /
     1  (1.0 + X)
        DT   =((-QX*QT*9.8*Q4*U/CP *QXE   -Q6*DRME   /RM)
     1    + EPS/CP)*(1.+X)/((1.+X+S+WT)*Q5)
        DX     = Q1*(Q3*DT     + 9.8*X*U/(287.*TE)*QXE)
       DV = V*(DRME/RM*(1.+X+S+WT)/(1.+X)+DT/T+9.8*U/(287.*QXE*TE)
     1            +(29./18.-1.)/((1.+X)**2*QX)*DX)
            DWT = -(1.+X+S+WT)/RM*((WT+X-XE)/(1.+XE)*DRME+WT*CHLR/(S+WT))
     1            -DX
            DNSTY = RFD*SALTD*(SALTM+RFM)/(SALTD*RFM+SALTM*RFD)
       DPVOL = 0.
555    ED = RK2*U*U*Q7*QQ/R2*2.0
       DEK = ED - ( EK - U*U/2.0 )*DRME/RM
     1        - EPS
            DS = -(1.+X+S+WT)*S/RM*(CHLR/(S+WT)
     1                 + DRME/(1.+XE))
       CALL PARTEQ (
     1  T, V, RM, X, S, WT, EPS, KEQ, NEQ, CG, RAD, DNSTY, PVOL,
     2  DY, R, RZT, Z, DV, Y, TR, P, TSALT, CF, DZ)
        RETURN
        END
$IBFTC DST      LIST,DECK,M94/2
      SUBROUTINE DSTR (
     1  CHEAN, CSIGMA,DST, KEQ, NEQ, RMIN, SLDTMP, T, ZMSS)
C
C ***********************************************************************
C
```

```
C     DSTR COMPUTES THE MEAN AND S.D. OF THE LOGNORMAL DISTRIBUTION
C     OF PARTICLE SIZE VS. MASS
C
C ************************************************************************
C
      DIMENSION
     1 TS[3], ZMSS[40]
C
C ************************************************************************
C ************************************************************************
C
      GO TO [040, 040, 200], KEQ
  040 TS [1] = 0.1587
      TS [2] = 0.5
      TS [3] = 0.8413
      NEXT = 1
      AT = ZMSS [1]
  060 DO 094 NP = 2, NEQ
      BT = AT + ZMSS [NP]
      IF [BT] 200, 200, 064
  064 IF [BT - TS [NEXT]] 090, 090, 066
  066 GO TO [068, 072, 076], NEXT
  068 AGA = AT
      BGA = BT
       GA=NP-1
      NEXT=2
      GO TO 064
  072 AGB = AT
      BGB = BT
       GB=NP-1
      NEXT = 3
      GO TO 064
  076 AGC = AT
      BGC = BT
       GC=NP-1
      GO TO 100
  090 AT = BT
  094 CONTINUE
C                                              ERROR, DO NOT UPGRADE
C                                              MEAN AND S.D.
      GO TO 200
  100 CMEAN =2.0E6* RMIN*[[1.2599211]**[GB+ [.5-AGB]/[BGB-AGB]-.5]]
      CSIGMA =SQRT[ 1.2599211**[GC-GA+ [.8413-AGC]/[BGC-AGC]
     1- [.1587-AGA]/[ BGA-AGA]]]
      GO TO [140, 140, 200], KEQ
  140 IF[T-SLDTMP] 142,142,200
  142 KEQ=3
  200 RETURN
      END
$IBFTC DVDX    LIST,DECK,M94/2
      SUBROUTINE DVD [
     1  CX, DPSTK, KDPST, MCX]
C
C ************************************************************************
C
C     DVD COMPUTES NUMBER OF DPST PER P.S.C.
C
C ************************************************************************
C
      DIMENSION
```

```
     1  CX (10, 90)                                                     DVDX
C                                                                       DVDX
C ***********************************************************************DVDX
C ***********************************************************************DVDX
C                                                                       DVDX
      HGHTMX = CX (4, MCX) - CX (3, MCX)                                DVDX
      DPSTK = HGHTMX / 304.801 + 1.0                                    DVDX
      IF (DPSTK - 3.0) 010, 012, 012                                    DVDX
  010 DPSTK = 3.0                                                       DVDX
  012 KDPST = DPSTK                                                     DVDX
      DPSTK = KDPST                                                     DVDX
      RETURN                                                            DVDX
      END                                                               DVDX
$IBFTC FSPX    LIST,DECK,M94/2                                          FSPX
      FUNCTION FSPEED (                                                 FSPX
     1  J, FMU, RA, RAD, PVOL, DNSTY)                                   FSPX
C     FSPEED - GENERATE THE PARTICLE FALLING SPEEDS                     FSPX
      DIMENSION                                                         FSPX
     1  RAD (40)                                                        FSPX
      PSIRE = 25.*PVOL*DNSTY*2.**(J-1)*RA/(FMU*FMU)                     FSPX
      IF(PSIRE - 120.) 1, 1, 2                                          FSPX
C                                                                       FSPX
1     RE = PSIRE*(.0416667+PSIRE*(-2.3363E-4 +PSIRE*(2.0154E-6          FSPX
     1                -6.9105E-9*PSIRE)))                               FSPX
      GO TO 3                                                           FSPX
C                                                                       FSPX
2     PP = .43429448*ALOG(PSIRE)                                        FSPX
      RE =-1.29536+PP*(.986+PP*(-4.6677E-2+1.1235E-3*PP   ))            FSPX
      RE = EXP (2.3025851*RE)                                           FSPX
C                                                                       FSPX
3     FSPEED = RE*FMU/(RA*RAD(J)*2.)                                    FSPX
      RETURN                                                            FSPX
      END                                                               FSPX
$IBFTC GAUSP   LIST,DECK,M94/2                                          GAUS
      FUNCTION GAUSSP(X)                                                GAUS
C                                                                       GAUS
C ***********************************************************************GAUS
C                                                                       GAUS
C     GAUSSP - EVALUATE THE GAUSSIAN PROBABILITY INTEGRAL               GAUS
C     CALCULATE THE NORMAL PROBABILITY FUNCTION FOR ARGUMENT X          GAUS
C     ACCURACY IS TO 2.5 UNITS IN THE FOURTH DECIMAL PLACE.             GAUS
C     REFERENCE     AMS 55 26.2.18                                      GAUS
C                                                                       GAUS
C ***********************************************************************GAUS
C ***********************************************************************GAUS
C                                                                       GAUS
      IF(X) 2, 1, 6                                                     GAUS
6     T = X                                                             GAUS
      GO TO 3                                                           GAUS
1     GAUSSP = .5                                                       GAUS
      RETURN                                                            GAUS
2     T = -X                                                            GAUS
3     GP = .5/(1.+T*(.196854+T*(.115194+T*(.000344+.019527*T))))**4     GAUS
      IF(X) 4, 4, 5                                                     GAUS
4     GAUSSP = GP                                                       GAUS
      RETURN                                                            GAUS
5     GAUSSP = 1. - GP                                                  GAUS
      RETURN                                                            GAUS
      END                                                               GAUS
$IBFTC GPSDX   LIST,DECK,M94/2                                          GPSD
```

```
      SUBROUTINE GPSD (                                                 GPSD
     1BARMU,ITAB,KRD,NTVL,      PS,FMASS,SV,PACT,SIGMA,IDISTR,ZMSS,     GPSD
     2SSAM,NEQ,DNSTY,RAD)                                               GPSD
C                                                                       GPSD
C     23 MARCH 1967                                                     GPSD
C                                                                       GPSD
C                                                                       GPSD
C ***********************************************************************GPSD
C                                                                       GPSD
C     GPSD COMPUTES THE P.S.C. INTERVALS, THE FRACTION OF MASS PER      GPSD
C       INTERVAL, THE MIDPOINT OF THE INTERVAL, AND THE RATIO OF        GPSD
C       SURFACE TO VOLUME (FREILING) PER INTERVAL.                      GPSD
C     SIZES RANGE 5.00 STANDARD DEVIATIONS (SIGMA) ON EACH SIDE         GPSD
C          OF THE MEAN (BARMU).                                         GPSD
C*************SPECIAL NOTE**********                                    GPSD
C     PRBT = PROBIT.                                                    GPSD
C     PRBT TABLE RANGE IS 0.0 THRU 10.0.                                GPSD
C     SURFACE TO VOLUME RATIO REQUIRES THAT INPUT SIGMA BE              GPSD
C       LESS THAN 1.38 SO AS NOT TO EXCEED LIMITS OF PRBT TABLE.        GPSD
C  KDM    - DIMENSION OF PRBT                                           GPSD
C  WDTH   - IS PRBT TABLE INTERVAL, I.E. FRACTION OF PROBIT DISTRIBUTIONGPSD
C             BETWEEN ADJACENT PROBIT POINTS.                           GPSD
C  ZMSS   - IS THE FRACTION OF TOTAL MASS WITH RADIUS RAD(I)            GPSD
C                                                                       GPSD
C ***********************************************************************GPSD
C                                                                       GPSD
      DIMENSION                                                         GPSD
     1PRBT(201),PS(200),FMASS(200),SV(200),PACT(200),ZMSS(40),RAD(40)   GPSD
C                                                                       GPSD
C ***********************************************************************GPSD
C                                                                       GPSD
C     DEFINE PROBIT TABLE                                               GPSD
C                                                                       GPSD
      DATA (PRBT(I),I=1,193,12)/10.,6.555,6.175, 5.915,5.706,5.524,     GPSD
     1 5.358,5.202,5.050,4.900, 4.747,4.588, 4.417,4.228,4.086,3.718,   GPSD
     2 3.249/,                                                          GPSD
     3      (PRBT(I),I= 2,12)                                           GPSD
     4/7.576,7.326,7.170,7.054,6.960,6.881,6.812,6.751,6.695,6.645,6.598GPSD
     5 /,  (PRBT(I),I=14,24)                                            GPSD
     6/6.514,6.476,6.440,6.405,6.372,6.341,6.311,6.282,6.254,6.227,6.200GPSD
     7 /,  (PRBT(I),I=26,36)                                            GPSD
     8/6.150,6.126,6.103,6.080,6.058,6.036,6.015,5.994,5.974,5.954,5.935GPSD
     9/                                                                 GPSD
      DATA (PRBT(I),I=38,48)                                            GPSD
     1/5.896,5.878,5.860,5.842,5.824,5.806,5.789,5.772,5.755,5.739,5.722GPSD
     2/                                                                 GPSD
      DATA (PRBT(I),I=50,60)                                            GPSD
     1/5.690,5.674,5.659,5.643,5.628,5.613,5.598,5.583,5.568,5.553,5.539GPSD
     2 /,  (PRBT(I),I=62,72)                                            GPSD
     3/5.510,5.496,5.482,5.468,5.454,5.440,5.426,5.412,5.399,5.385,5.372GPSD
     4 /,  (PRBT(I),I=74,84)                                            GPSD
     5/5.345,5.332,5.319,5.305,5.292,5.279,5.266,5.253,5.240,5.228,5.215GPSD
     6 /,  (PRBT(I),I=86,96)                                            GPSD
     7/5.189,5.176,5.164,5.151,5.138,5.126,5.113,5.100,5.088,5.075,5.063GPSD
     8/                                                                 GPSD
      DATA (PRBT(I),I=98,108)                                           GPSD
     1/5.038,5.025,5.013,5.000,4.987,4.975,4.962,4.950,4.937,4.925,4.912GPSD
     2/                                                                 GPSD
      DATA (PRBT(I),I=110,120)                                          GPSD
     1/4.887,4.874,4.862,4.849,4.836,4.824,4.811,4.798,4.785,4.772,4.760GPSD
```

```
     2 /, (PRBT(I),I=122,132)
     3/4.734,4.721,4.708,4.695,4.681,4.668,4.655,4.642,4.628,4.615,4.601
     4 /, (PRBT(I),I=134,144)
     5/4.574,4.560,4.546,4.532,4.518,4.504,4.490,4.476,4.461,4.447,4.432
     6 /, (PRBT(I),I=146,156)
     7/4.402,4.387,4.372,4.357,4.341,4.326,4.310,4.294,4.278,4.261,4.245
     8/
      DATA (PRBT(I),I=158,168)
     1/4.211,4.194,4.176,4.158,4.140,4.122,4.104,4.085,4.065,4.046,4.026
     2/
      DATA (PRBT(I),I=170,180)
     1/3.985,3.964,3.942,3.920,3.897,3.874,3.850,3.825,3.800,3.773,3.746
     2 /, (PRBT(I),I=182,192)
     3/3.689,3.659,3.628,3.595,3.560,3.524,3.486,3.445,3.402,3.355,3.305
     4 /, (PRBT(I),I=194,201)
     5/3.188,3.119,3.040,2.946,2.830,2.674,2.424,0. /
C
C ***********************************************************************
C
C     IS A LOGNORMAL OR TABULAR PARTICLE SIZE DISTRIBUTION USED-
C          LOGNORMAL TO  17
C          TABULAR TO   500
C
      IF(IDISTR)017,017,500
  500 NTVL = NEQ
      ITAB=NEQ
      KDM = NEQ+1
      SUM = 0.0
      DO 510 I=1,NEQ
  510 SUM = SUM +  ZMSS(I)/RAD(I)
      SUM = 1.0/SUM
      CON = 2.0*(RAD(NEQ)*RAD(NEQ-1))**0.5
      DO 520 I=1,NEQ
      KDM = KDM-1
      FMASS(I) =  ZMSS(KDM)
      PS(I) = 2.0*RAD(KDM)*10.0**6
      SV(I) = SUM/RAD(KDM)
      PACT(I) = CON
  520 CON = CON/1.2599211
      GO TO 600
  017 KDM =  201
      KDMM = KDM - 1
      WDTH=1.0/FLOAT(KDMM)
      DO 004 MA=1,KDMM
      PS(MA)=0.0
      FMASS(MA)=0.0
      SV(MA)=0.0
  004 PACT(MA)=0.0
      IF (NTVL) 101, 101, 104
  101 NTVL = 10
  104 INTR = KDMM / NTVL
      ITAB = 0
      SUM = 0.0
      SIZE=WDTH*FLOAT(INTR)
  200 KA = KDM - INTR
      DO 246 KB = 1, KA, INTR
      KC = KB + INTR
      UP = BARMU - (5.0 - PRBT (KC)) * SIGMA
      DN = BARMU - (5.0 - PRBT (KB)) * SIGMA
      ITAB = ITAB + 1
```

```
      PS(ITAB)=10.0**(0.5*(UP+DN))
C                                                 SAVE FOR RATIO OF
C                                                   SURFACE TO VOLUME
      SV(ITAB)=UP
      PACT(ITAB) =1(.**UP
  244 SUM = SUM + SIZE * 100.0
      FMASS(ITAB)=SIZE
  246 CONTINUE
      IF (SUM -  99.9) 250, 300, 300
  250 KB = ITAB + INTR + 1
      UP = BARMU - ( 5.0 - PRBT (KDM)) * SIGMA
      DN = BARMU - (5.0 - PRBT (KB)) * SIGMA
      ITAB = ITAB + 1
      PS(ITAB)=10.0**(0.5*(UP+DN))
      FMASS(ITAB)=(100.0-SUM)/100.0
      SV(ITAB)=UP
      PACT(ITAB) =10.**UP
C                                                 COMPUTE RATIO OF
C                                                   SURFACE TO VOLUME
  300 BARSUR = BARMU -(SIGMA ** 2)*2.3025851
      KDA = 2
      FRKDA = 1.0
      DO 338 KE = 1, ITAB
      SPRBT=5.0+((SV(KE)-BARSUR)/SIGMA)
      DO 310 KD = KDA, KDM
      IF (SPRBT - PRBT (KD)) 310, 308, 308
  308 FRKDB = (PRBT (KD - 1) - SPRBT) / (PRBT (KD - 1) - PRBT (KD))
      PKD = KD - KDA - 1
      SV(KE)=(WDTH*(FRKDA+PKD+FRKDB))/FMASS(KE)
      FRKDA = 1.0 - FRKDB
      KDA = KD
      GO TO 338
  310 CONTINUE
C                                                 ERROR IN RATIO,
C                                                   LOAD WITH FAKE.
      DO 326 KF = KE, ITAB
  326 SV(KF)=99999999.0
      GO TO 340
  338 CONTINUE
  340 DO 344 KG = 1, ITAB
      IF(SV(KG))342,342,344
  342 SV(KG)=WDTH/100.0
  344 CONTINUE
  600 RETURN
      END
$IBFTC ICRX    LIST,DECK,M94/2
      SUBROUTINE ICRD (
     1 ALT,ATID,ATP,DNID,DNS,ETA,NEQ,NPVA,NTVL,PRS,RHZ,RLH,TW,KRX,IRISE,
     2 SLM, ZBRSTZ,ZTRP,IRAD,IPAM,SLDTMP,FW,GRV,KCLD,KDI,KEQ,KRD,KTR)
C
C      26 FEBRUARY 1967
C
C ********************************************************************
C
      DIMENSION
     1  ATID (12),                    12),
     2  ALT (260),ATP (260),ETA (26     RV (260),PRS (260),
     3  RHZ (260),RLH (260),SLM (26
C
C ********************************************************************
```

```
C ****************************************************************ICRX
C      CONTROL PARAMETER GLOSSARY                                  ICRX
C                                                                  ICRX
C         NEQ     NUMBER OF PARTICLE CLASSES IN CRM CALCULATIONS   ICRX
C         NTVL    NUMBER OF PARTICLE CLASSES IN RSXP CALCULATIONS  ICRX
C         KDI     NUMBER OF WAFERS PER PARTICLE SIZE CLASS (RSXP)  ICRX
C         IRAD    WAFER SUBDIVISION FACTOR (RSXP)                  ICRX
C         KCLD    CRM DEBUG PRINTOUT CONTROL                       ICRX
C         KRX     RSXP DEBUG PRINTOUT CONTROL                      ICRX
C         KEQ     PARTICLE COALESCENCE CALCULATION CONTROL         ICRX
C         IPAM    PARTICLE ACTIVITY CALCULATION CONTROL (ALWAYS ZERO)  ICRX
C                                                                  ICRX
C ****************************************************************ICRX
C                                                                  ICRX
 1000 FORMAT(1H1,///51X19H* * * * * * * * * *//12X101HT H E   D E P A R ICRX
     1T M E N T   O F   D E F E N S E   F A L L O U T   P R E D I C T I ICRX
     2O N   S Y S T E M,//51X,19H* * * * * * * * * *////52X,17HCLOUD-RISICRX
     3E MODULE///55X,11HPREPARED BY/                               ICRX
     4 42X,37HNAVAL RADIOLOGICAL DEFENSE LABORATORY/ 55X,11HS.F.,CALIF./ICRX
     5 58X,3HAND/ 43X,34HTECHNICAL OPERATIONS RESEARCH,INC./52X, 17HBURLICRX
     6INGTON, MASS.////)                                           ICRX
 1100 FORMAT(12A6)                                                 ICRX
 1200 FORMAT(8I4)                                                  ICRX
 1300 FORMAT(E12.5)                                                ICRX
 1400 FORMAT(20X,32HCLOUD RISE RUN IDENTIFICATION - 12A6//20X,32HATMOSPHICRX
     1ERE IDENTIFICATION      = 12A6//20X,27HELEVATION OF GROUND ZERO = FICRX
     28.1, 7H METERS/20X,34HSOIL SOLIDIFICATION TEMPERATURE = F8.1,   ICRX
     3 15H DEGREES KELVIN/                                         ICRX
     4 20X,25HALTITUDE OF TROPOPAUSE = F8.1,7H METERS/20X,28HPARTICLE DEICRX
     5NSITY (C.G.S.) = F8.4/                           20X,13HYIEICRX
     6LDS (KT) -/23X, 8HTOTAL = E11.4,3X,10HFISSION = E11.4///)    ICRX
 1500 FORMAT(20X, 27HCOMPUTATION CONTROL INPUTS-/20X,7H    NEQ,7H   NTVLICRX
     1,7H    KDI,                                                  ICRX
     2          7H   IRAD,7H   KCLD,7H    KRX,7H    KEQ, 7H   IPAM/  ICRX
     3 20X,8I7///)                                                 ICRX
 1600 FORMAT(20X, 26HCRM COMPUTATION CONTROLS -/23X,               ICRX
     1                                     44HNUMBER OF PARTICLE SIZICRX
     2E CLASSES REQUESTED = I4/23X, 16HPARTICLE GROWTH A6,10H REQUESTED/ICRX
     3//)                                                          ICRX
 1700 FORMAT(20X, 27HRSXP COMPUTATION CONTROLS -/23X,              ICRX
     1                                     44HNUMBER OF PARTICLE SIZICRX
     2E CLASSES REQUESTED = I4/23X, 54HNUMBER OF CLOUD SUBDIVISIONS(WAFEICRX
     3RS) PER SIZE CLASS = I4/                                     ICRX
     4                      23X, 27HWAFER SUBDIVISION FACTOR = I4) ICRX
  998 FORMAT(1H1,                                                  ICRX
     1          50X,10HATMOSPHERE,51X//7X,3HALT,11X,3HATP,11X,3HRHZ,11X,3ICRX
     2HETA,11X,3HPRS,11X,3HGRV,11X,3HSLM,11X,3HRLH)                ICRX
  999 FORMAT(//(8(2X,E12.5)))                                      ICRX
C                                                                  ICRX
C ****************************************************************ICRX
C ****************************************************************ICRX
C                                                                  ICRX
      DATA WORD1,WORD2/6H  IS  ,6HIS NOT/                          ICRX
C                                                                  ICRX
C ****** *********************************************************ICRX
C                                                                  ICRX
C  SEQUENCE OF INPUTS                                              ICRX
C                                                                  ICRX
C  1  READ CLOUD RISE IDENTIFICATION                               ICRX
C  2  READ CONTROL CARD                                            ICRX
```

```
C  3  READ GZ ELEVATION [METERS]                                           ICRX
C  4  READ SOIL SOLIDIFICATION TEMPERATURE [DEGREES KELVIN]                ICRX
C  5  READ FISSION YIELD     [KT]                                          ICRX
C  6  READ ALTITUDE  OF TROPOPAUSE [METERS]                                ICRX
C  7  READ PARTICLE DENSITY                                                ICRX
C  8  READ ATMOSPHERE IDENTIFICATION                                       ICRX
C                                                                         ICRX
C ***********************************************************************ICRX
C                                                                         ICRX
      READ[KRD,1100]DNID                                                  ICRX
      READ[KRD,1200]NEQ,NTVL,KDI,IRAD,KCLD,KRX,KEQ,IPAM                   ICRX
      READ[KRD,1300]ZBRSTZ                                                ICRX
      READ[KRD,1300]SLDTMP                                                ICRX
      READ[KRD,1300]FW                                                    ICRX
      READ[KRD,1300]ZTRP                                                  ICRX
      READ[KRD,1300]DNS                                                   ICRX
      READ[KRD,1100]ATID                                                  ICRX
C                                                                         ICRX
      CALL ATMR[                                                          ICRX
     1  ALT, ATP, ETA, GRV, KRD, NPVA, PRS, RHZ, RLH, SLM, ZTRP,KTR,      ICRX
     2 IRISE]                                                             ICRX
C                                                                         ICRX
C ***********************************************************************ICRX
C                                                                         ICRX
C  SEQUENCE OF OUTPUTS                                                    ICRX
C                                                                         ICRX
C  1  WRITE CLOUD RISE MODULE HEADING                                     ICRX
C  2  WRITE INPUT DATA                                                    ICRX
C  3  WRITE COMPUTATION CONTROLS                                          ICRX
C  4  WRITE CRM COMPUTATION CONTROLS                                      ICRX
C  5  WRITE RSYP COMPUTATION CONTROLS                                     ICRX
C  6  WRITE ATMOSPHERE PROPERTIES                                         ICRX
C                                                                         ICRX
C ***********************************************************************ICRX
C                                                                         ICRX
      WRITE[KTR,1000]                                                     ICRX
      WRITE[KTR,1400] DNID,ATID,ZBRSTZ,SLDTMP,ZTRP,DNS,TW,FW              ICRX
      WRITE[KTR,1500]NEQ,NTVL,KDI,IRAD,KCLD,KRX,KEQ,IPAM                  ICRX
      IF[KEQ]122,111,122                                                  ICRX
  122 WORD=WORD1                                                          ICRX
      GO TO 133                                                           ICRX
  111 WORD=WORD2                                                          ICRX
  133 WRITE[KTR,1600]NEQ,WORD                                             ICRX
      WRITE[KTR,1700]NTVL,KDI,IRAD                                        ICRX
      WRITE[KTR,998]                                                      ICRX
      WRITE [KTR,999][ALT[I],ATP[I],RHZ[I],ETA[I],PRS[I],GRV[I],SLM[I],   ICRX
     1RLH[I],I=1,NPVA]                                                    ICRX
      KCLD = KCLD + 1                                                     ICRX
      KRX = KRX + 1                                                       ICRX
      ZBRSTZ = ZBRSTZ * 3.280833                                          ICRX
      RETURN                                                              ICRX
      END                                                                 ICRX
$IBFTC PAMX     LIST,DECK,M94/2                                           PAMX
      SUBROUTINE PAM                                                      PAMX
      RETURN                                                              PAMX
      END                                                                 PAMX
$IBFTC PARDI    LIST,DECK,M94/2                                           PARD
      SUBROUTINE PARDIS[NEQ,PM,PS,Y,RMIN]                                 PARD
C                                                                         PARD
C***********************************************************************PARD
```

```
C                                                                       PARD
C     GENERATE INITIAL MASS DISTRIBUTION                                PARD
C                                                                       PARD
C***********************************************************************PARD
C                                                                       PARD
      DIMENSION Y(40)                                                   PARD
C                                                                       PARD
C***********************************************************************PARD
C***********************************************************************PARD
C                                                                       PARD
      DELTAX = ALOG(2.0)/3.0                                            PARD
      X = ALOG(RMIN)-DELTAX/2.0                                         PARD
      YSUM = 0.0                                                        PARD
      DO 20 J=1,NEQ                                                     PARD
      X = X+DELTAX                                                      PARD
      Y(J) = GAUSSP((X-PM)/PS)-YSUM                                     PARD
 20   YSUM = YSUM+Y(J)                                                  PARD
      Y(NEQ) = 1.0-(YSUM-Y(NEQ))                                        PARD
      RETURN                                                            PARD
      END                                                               PARD
$IBFTC PARTE    LIST,DECK,M94/2                                         PART
      SUBROUTINE PARTEQ (                                               PART
     1  T, V, RM, X, S, WT, EPS, KEQ, NEQ, CG, RAD, DNSTY, PVOL,        PART
     2  DY, R, RZT, Z, DV, Y, TR, P, TSALT, CF, DZ)                     PART
C                                                                       PART
C **********************************************************************PART
C                                                                       PART
C     PARTEQ - EVALUATE THE PARTICLE NUMBER DISTRIBUTION DERIVATIVES    PART
C                                                                       PART
C **********************************************************************PART
C                                                                       PART
      DIMENSION                                                         PART
     1  Y (40), CG (40), RAD (40), DY (40), CF (40, 40)                 PART
C                                                                       PART
C **********************************************************************PART
C **********************************************************************PART
C                                                                       PART
  009 CALL COLLIS (                                                     PART
     1  T,V,RM,X,S,WT,EPS,NEQ,CF,CG,RAD,DNSTY,PVOL,P,KEQ)                PART
      IF(Z - V/(4.1687902*R*R) ) 83, 83, 84                             PART
83    DO 830 J = 1, NEQ                                                 PART
830   CG(J) = 0.0                                                       PART
      GO TO 85                                                          PART
84    IF(TSALT-T) 83, 842, 842                                          PART
842   DO 840 J = 1, NEQ                                                 PART
      IF (DZ) 085, 085, 1841                                            PART
 1841 IF (CG (J) - 1.0) 841, 840, 840                                   PART
841   CG(J) = 0.0                                                       PART
840   CONTINUE                                                          PART
85    CONTINUE                                                          PART
      GO TO (086, 086, 186), KEQ                                        PART
  086 DO 10 J = 1, NEQ                                                  PART
10    DY(J) =                                                           PART
     1SYSTEM(J,NEQ,Y,CF)                                                PART
      RETURN                                                            PART
  186 DO 80 J = 1, NEQ                                                  PART
80    DY(J) = 0.0                                                       PART
  200 RETURN                                                            PART
      END                                                               PART
$IBFTC RKGX     LIST,DECK,M94/2                                         RKGX
```

```
      SUBROUTINE RKGILL [
     1  ALT, ATP, B0, B1, B2, CF, CG, CMLR, C3, DNSTY, DST, DU, DWT,
     2  D0, D1, D2, ED, EK, EPS, HLR, KEQ, N, NEQ, NNN, NPVA,
     3  P, PRS, PVOL, QI, RAD, RFD, RFM, RF0, RF1, RF2,
     4  RK2, RK3, RL, RLH, RM, RZT, S, SALTD, SALTM, T, TE,
     5  TF, TR, TRQ, TSALT, U, V, WT, X, Y, Z]
C
C *********************************************************************
C
C     FORTRAN RUNGE-KUTTA INTEGRATOR OF D. GALANT.
C
C *********************************************************************
C
      DIMENSION
     1  DVBL [50], RKG [50], VBL [50]
      DIMENSION
     1 ALT[260],ATP[260],CG[40],DY[40],
     2PRS[260],RAD[40],RLH[260],Y[40]
      DIMENSION CF [40, 40]
C
C *********************************************************************
C *********************************************************************
C
      H = DST
      KTRY = 0
      KYCL = 1
      VBL [1] = WT
      VBL [2] = RM
      VBL [3] = U
      VBL [4] = X
      VBL [5] = T
      VBL [6] = V
      VBL [7] = Z
      VBL [8] = EK
      VBL [ 9] = S
      VBL [10] = PVOL
      DO 018 NP = 11, NNN
  018 VBL [NP] = Y [NP - 10]
  020 CALL DERIV [
     1  ALT, ATP, B0, B1, B2, CF, CG, CMLR, C3, DEK, DNSTY,
     2  DPVOL, DRM, DS, DT, DU, DV, DWT, DX, DY, DZ,
     3  D0, D1, D2, ED, EK, EPS, HLR, KEQ, N, NEQ, NPVA,
     4  P, PRS, PVOL, QI, RAD, RFD, RFM, RF0, RF1, RF2, RK2, RK3,
     5  RL, RLH, RM, RZT, S, SALTD, SALTM, T, TE, TF, TR,
     6  TRQ, TSALT, U, V, WT, X, Y, Z]
      VBL [1] = WT
      DVBL [1] = DWT
      DVBL [2] = DRM
      DVBL [3] = DU
      DVBL [4] = DX
      DVBL [5] = DT
      DVBL [6] = DV
      DVBL [7] = DZ
      DVBL [8] = DEK
      DVBL [9] = DS
      DVBL [10] = DPVOL
      DO 022 NP = 11, NNN
  022 DVBL [NP] = DY [NP - 10]
      KTRY = KTRY + 1
      GO TO [001, 003, 005, 007], KTRY
```

```
  001 DO 2 J = 1, NNN
      VBL(J) = VBL(J) + .5*H*DVBL(J)
  002 RKG(J) = DVBL(J)
      GO TO 010
  003 DO 4 J = 1, NNN
      VBL(J) = VBL(J) + .29289322*H*(DVBL(J) - RKG(J))
  004 RKG(J) = .58578644*DVBL(J) + .12132034*RKG(J)
      GO TO 010
  005 DO 6 J = 1, NNN
      VBL(J) = VBL(J) + 1.7071068*H*(DVBL(J)-RKG(J))
  006 RKG(J) = 3.41421356*DVBL(J)- 4.1213203*RKG(J)
      GO TO 010
  007 DO 8 J = 1, NNN
  008 VBL(J) = VBL(J) + .16666667*H*(DVBL(J) - 2.*RKG(J))
      KYCL = 2
  010 WT = VBL (1)
      RM = VBL (2)
      U  = VBL (3)
      X  = VBL (4)
      T  = VBL (5)
      V  = VBL (6)
      Z  = VBL (7)
      EK = VBL (8)
      S = VBL (9)
      PVOL = VBL (10)
      DO 1010 NP = 1, NEQ
 1010 Y (NP) = VBL (NP + 10)
      GO TO (020, 030), KYCL
  030 RETURN
      END
$IBFTC RSTX    LIST,DECK,M94/2
      SUBROUTINE RSTR (
     1  DST, EK, KSV, N, NEQ, PVOL, RM, S, SAVE, SMALLT, SMSS,
     2  T, U, V, WT, X, Y, Z)
C
C ********************************************************************
C
C     RSTR PRESERVES AND/OR RESTORES CRM VARIABLES
C
C ********************************************************************
C
      DIMENSION
     1  PSMSS (50), PY (50), SMSS (50), Y (50)
C
C ********************************************************************
C ********************************************************************
C
      GO TO (002, 052), KSV
  002 PEK = EK
      PPVOL = PVOL
      PRM = RM
      PS = S
      PT = T
      PU = U
      PV = V
      PWT = WT
      PX = X
      PZ = Z
      DO 012 NP = 1, NEQ
      PSMSS (NP) = SMSS (NP)
```

```
  012 PY (NP) = Y (NP)
      GO TO 100
  052 SAVE = DST
      DST = 0.5
      SMALLT = SMALLT - SAVE
      EK = PEK
      PVOL = PPVOL
      RM = PRM
      S = PS
      T = PT
      U = PU
      V = PV
      WT = PWT
      X = PX
      Z = PZ
      DO 053 NP = 1, NEQ
      SMSS (NP) = PSMSS (NP)
  053 Y (NP) = PY (NP)
      N = 3
  100 RETURN
      END
$IBFTC RSXPX   LIST,DECK,M94/2
      SUBROUTINE RSXP (
     1  ALT, CX, DNS, ETA, GRV, ITAB, KDI, KRD, KRX, KTR,
     2     MCX,NPVA,PS,FMASS,SV,PACT,RHZ,SSAM,SLM,DPX,
     3   PV,PVI,TIMCX,          TW,  ZBRSTZ,DETID,DNID,IRAD,IRISE,
     4 SLDTMP,TMSD,FW,SIGMA,SPARE1,HOB,SPARE3,IDISTR)
C
C     23 MARCH 1967
C
C ***********************************************************************
C
C     RSXP COMPUTES THE RISE AND EXPANSION OF DEPOSIT INCREMENTS AND
C     TABULATES THEIR TIME-SPACE LOCATION AND MASS PER UNIT AREA
C     NOTE - EFFECTS OF WINDS ARE NOT CONSIDERED
C
C ***********************************************************************
C
      DIMENSION
     1ALT(260),CX(10,90),ETA(260),GRV(260),PS(200),FMASS(200),SV(200),
     2PACT(200),RHZ(260),SLM(260)   ,PVI(90),RHOPS(6),VISPS(6),TIMCX(90)
      DIMENSION
     1 DPST(12),DPSTZ(3),DPX(3,90),GDPST(6,100),
     2PV(260),DETID(12),DNID(12),VISCX(90)
  444 FORMAT (1H1 /
     1  10X18HDEPOSIT INCREMENTS    //
     1  18X3HACT, 8X3HTIM, 8X3HRAD, 8X3HPSC, 8X3HFRA,
     2   8X3HINC, 8X3HTBZ, 8X3HBLN, 8X3HMAS, 8X3HALT)
  777 FORMAT (10X1PE11.3, 9E11.3)
  888 FORMAT(    108H THE RADIUS OF AN NRDL CLOUD WAFER HAS BEEN FOUND TO
     1 BE LESS THAN HALF THE DIAGONAL OF A CLOUD SUBDIVISION. / 36H THE
     2WAFER PROPERTIES ARE -  RADIUS=E12.5,2X,14HPARTICLE SIZE=E12.5,2X,
     39HALTITUDE=E12.5/ 6H TIME=E12.5,2X,15HMASS/UNIT AREA=E12.5, 57H.
     4A SINGLE WAFER WILL BE INPUT TO THE TRANSPORT MODULE. /1H0)
C
C ***********************************************************************
C ***********************************************************************
C
      DATA DENT/6H IRISE/
      CALL SCTN (
```

```
     1  CX, DPST, DPSTK, DPSTZ, DPX, KDI, KDPST, MCX, ZBRSTZ)
      GO TO (190, 188), KRX
  188 WRITE(KTR,444)
C                                          MAXIMUM DPST AREA
  190 AREAMX = 3.14159 * CX (5, MCX) ** 2
      ZBRSTM=ZBRSTZ/3.28083
      ROPART=DNS*1000.0
      NSP=1
C     THIS IS A HUEBSCH CLOUD. NSP IS USED TO INDICATE THIS.
C           THE MNEMONIC ITAB IS CHANGED TO NPS IN LINK 4
      NPS=ITAB
      XNPS=FLOAT(NPS)
C           THE MNEMONIC NPVA IS CHANGED TO NAT IN LINK 4
  942 NAT=NPVA
      DO 996 J=1,NAT
C           THE MNEMONIC ETA IS CHANGED TO ATEMP IN LINK 4. THE UNITS OF
C           ATEMP ARE KGM/M/SEC
      ETA(J)=ETA(J)*0.1
C           THE MNEMONIC RHZ IS CHANGED TO RHO IN LINK 4. THE UNITS OF
C           RHO ARE KGM/M**3
  996 RHZ(J)=RHZ(J)*1000.0
C           THE MNEMONIC MCX IS CHANGED TO NPOSIT
      NPOSIT=MCX
      REWIND IRISE
      WRITE(IRISE)DENT
C
C     COMPUTE WIDTH OF CLOUD SUBDIVISIONS
      BZ=CX(5,MCX)/FLOAT(IRAD)
      WRITE(IRISE)FW,SSAM,SLDTMP,THSD,SIGMA,TW,HOB,BZ ,ROPART,NSP,
     1 CX(5,MCX),ZBRSTZ
C           THE MNEMONIC DNID IS CHANGED TO CRID IN LINK 4
      WRITE(IRISE)(DNID(J),J=1,12)
      WRITE(IRISE)(DETID(J),J=1,12)
      WRITE(IRISE)NPS
C  PS      - ARRAY(200), PARTICLE SIZE CLASS MIDPOINT IN MICRONS
C            EXPOSURE RATES AT 1 HOUR
C  SV      - ARRAY(200), SURFACE TO VOLUME RATIO OF I-TH PARTICLE SIZE
      WRITE(IRISE)(PS(J),FMASS(J),PACT(J),SV(J),J=1,NPS)
      WRITE(IRISE)NAT
      WRITE(IRISE)(ETA(J),RHZ(J),J=1,NAT)
      WRITE(IRISE)NPOSIT
C           THE MNEMONIC CX(1,J) IS CHANGED TO TC IN LINK 4
C           THE MNEMONIC CX(3,J) IS CHANGED TO ZB IN LINK 4
C           THE MNEMONIC CX(4,J) IS CHANGED TO ZT IN LINK 4
C           THE MNEMONIC CX(6,J) IS CHANGED TO VB IN LINK 4
C           THE MNEMONIC CX(7,J) IS CHANGED TO VT IN LINK 4
      WRITE(IRISE) (CX(3,J),CX(4,J),CX(1,J), CX(6,J), CX(7,J),J=1,NPOSIT
     1)
      FROG=1.3066667E-17*ROPART
      BZ2=BZ/2.0
C  LODD    - LENGTH OF PARTICLE DESCRIPTION DATA BLOCK
      LODD=0
C     SET UP ONE-DIMENSIONAL TABLES OF CLOUD VISCOSITY
C     AND TEMPERATURE
      DO 6045 J=1,MCX
      VISCX(J)= 1.458E-6 *CX(9,J)**1.5/(110.4+CX(9,J))
 6045 TIMCX(J)=CX(1,J)
      KCX = MCX - 1
C     FIND MAXIMUM TOP RISE VELOCITY
      BIGVEL =CX(7,1)
```

```
      DO 6050 J=2,MCX
 6050 BIGVEL= (BIGVEL+ CX(7,J)+ ABS (BIGVEL-CX(7,J)))/2.
  200 DO 278 MA = 1, ITAB
C                                            COMPUTE PSC FALL SPEEDS
C     COMPUTE BELOW-CLOUD PARTICLE SETTLING RATES
      DO 202 J=1,NAT
  202 CALL FALRAT(ALT(J),PS(MA),PV(J),ETA,RHZ,FHOG,KTR)
C     COMPUTE IN-CLOUD SETTLING RATES
      DO 203 J=1,MCX
      RHOPS(6)=CX(10,J)
      VISPS(6)= VISCX(J)
  203 CALL FALRAT( 0.0,PS(MA), PVI(J), VISPS, RHOPS, FROG,KTR)
      INCR = KDPST * (MA-1)
      DO 258 MB = 1, KDPST
C                                            INITIAL DPST VARIABLES
      DPST (4) = CX (1, 1)
      DPST (5) = CX (5, MCX)
      DPST(6)=PS(MA)
C                                            NUMBER DPST IN ORDER COMPUTED
      DPST (8) = INCR + MB
C                                            MASS LOAD PER M.SQ.
      DPST(11)=SSAM*FMASS(MA)/(DPSTK*AREAMX)
      BM = MB
      DPST (12) = DPSTZ (2) + BM * DPSTZ (1)
      ZLST=DPST(12)
      KBASE = 1
      JBASE = 1
C                                            COMPUTE DPST TRAVEL
      DO 238 MC = 1, KCX
      ZVSB = DPST (12) - CX (3, MC)
      IF (ZVSB) 204, 210, 210
  204 GO TO (206, 208), KBASE
C                                            ADJUST DPST RADIUS AND ACTIVIT
C                                            FOR LEAVING CLOUD
  206 KBASE = 2
      MD = MC - 1
  207 EXTM = (ZLST - CX (3, MD)) / (CX (6, MD) - UP + DN)
 1207 HRDS = CX (5, MD) + EXTM * CX (8, MD)
      DPST(5)= HRDS*EXP( -1.61*SQRT(CX(7,MD)/BIGVEL))
      ADJ ST =(CX(5,MCX) /DPST(5))**2
      DPST (11) = DPST (11) * ADJST
      DPST(4)=CX(1,MD)+EXTM
      DPST(12)= ZLST     + (UP-DN)*EXTM
      GO TO (208, 233), JBASE
C                                            COMPUTE BELOW-CLOUD LIFT
C                                            AND FALL SPEEDS
  208 UP = CX (6, MC) + ZVSB * DPX (2, MC)
      CALL TRPL (
     1 DPST (12), NPVA, ALT, PV, DN)
      GO TO 212
C                                            COMPUTE INSIDE-CLOUD LIFT
C                                            AND FALL SPEEDS
  210 UP = CX (6, MC) + ZVSB * DPX (1, MC)
      CALL TRPL(DPST(4), MCX, TIMCX, PVI, DN)
C                                            COMPUTE NEXT DPST ALTITUDE
  212 ZNXT = DPST (12) + CX (2, MC) * (UP - DN)
      IF (ZNXT - ZBRSTM) 220, 220, 230
C                                            COMPUTE DPST TIME
C                                            OF ARRIVAL ON FALLOUT FIELD
  220 EXTM = (ZBRSTM- DPST(12))/(UP - DN)
```

```
      DPST (4) = DPST (4) + EXTM
      DPST (12) = ZBRSTM
      JBASE = 2
      MD = MC
      GO TO(1207, 233), KBASE
  230 DPST (4) = DPST (4) + CX (2, MC)
      ZLST=DPST(12)
      DPST (12) = ZNXT
  238 CONTINUE
C   ARE WAFERS TO BE PRINTED. YES TO  235
  233 GO TO (240, 235), KRX
  235 WRITE(KTR,777)
     1  (DPST (I), I = 3, 12)
C                                             STORE DPST FOR TRANSPORT
  240 XR=BZ2
      YR=BZ2
      IF(DPST(4).LT.CX(1,1))  DPST(4)=CX(1,1)
 5060 RADIUS=DPST(5)
      RAD2=RADIUS**2
 5010 IF(RAD2-2.0*BZ2**2)5020,1004,1004
 5020 GO TO(5022,5021),KRX
 5021 WRITE(KTR,888)                      DPST(5),DPST(6 ),DPST(12),
     1DPST(4),DPST(11)
 5022 LODD=LODD+1
      GDPST(6,LODD)=DPST(12)
      GDPST(4,LODD)=DPST( 6)
      GDPST(3,LODD)=DPST( 4)
      GDPST(5,LODD)=DPST(11)*(RADIUS/BZ )**2 *3.14159
      GDPST(1,LODD)=0.
      GDPST(2,LODD)=0.
      GO TO 5030
 1003 IF((XR)**2+(YR)**2-RAD2)1001,1001,1002
C   COMPUTE CORRECTED MASS PER UNIT AREA (DPST(11))
 1004 KC=0
      EX=BZ2
      EY=BZ2
 1011 KC=KC+4
      EX=EX+BZ
 1013 IF((EX)**2+(EY)**2-RAD2)1011,1011,1012
 1012 EY=EY+BZ
      EX=BZ2
      IF(EY-RADIUS)1013,1013,1014
 1014 DPST(11)=DPST(11)*(3.14159*RADIUS**2)/(FLOAT(KC)*BZ**2)
 1001 LODD=LODD+1
      LL=LODD+3
      DO 1050 J=LODD,LL
      GDPST(6,J)=DPST(12)
      GDPST(4,J)=DPST(6)
      GDPST(3,J)=DPST(4)
 1050 GDPST(5,J)=DPST(11)
      GDPST(1,LODD)=XR
      GDPST(2,LODD)=YR
      LODD=LODD+1
      GDPST(1,LODD)=XR
      GDPST(2,LODD)=-YR
      LODD=LODD+1
      GDPST(1,LODD)=-XR
      GDPST(2,LODD)=-YR
      LODD=LODD+1
      GDPST(1,LODD)=-XR
```

```
      GDPST(2,LODD)=YR
 5030 IF(LODD- 97)1100,1010,1010
 1100 XR=XR+BZ
      GO TO 1003
 1002 YR=YR+BZ
      XR=BZ2
      IF(YR-RADIUS)1003,1003,258
 1010 WRITE(IRISE)LODD
      WRITE(IRISE)(GDPST(1,J),GDPST(2,J),GDPST(6,J),GDPST(3,J),
     1GDPST(4,J),GDPST(5,J),J=1,LODD)
      LODD=0
      GO TO 1100
  258 CONTINUE
  278 CONTINUE
 1030 WRITE(IRISE)LODD
      WRITE(IRISE)(GDPST(1,J),GDPST(2,J),GDPST(6,J),GDPST(3,J),
     1GDPST(4,J),GDPST(5,J),J=1,LODD)
      LODD=0
      WRITE(IRISE)LODD
      END FILE IRISE
      REWIND IRISE
      RETURN
      END
$IBFTC SCTNX   LIST,DECK,M94/2
      SUBROUTINE SCTN (
     1  CX, DPST, DPSTK, DPSTZ, DPX, KDI, KDPST, MCX, ZBRSTZ)
C
C ***********************************************************************
C
C  COMPUTES -
C       1) NUMBER OF EQUAL HEIGHT DEPOSIT INCREMENTS PER P.S.C.
C       2) INITIAL TIME-SPACE POSITIONS OF DEPOSIT INCREMENTS
C       3) VERTICAL EXPANSION RATES USED PER CLOUD LIFT TIME INTERVAL
C       4) TABULATES PER TIME INTERVAL CLOUD RISE AND EXPANSION VARIABLES
C            TO BE USED TO LIFT DEPOSIT INCREMENTS
C
C ***********************************************************************
C
      DIMENSION
     1  CX (10, 90), DPX (3, 90), DPST (12), DPSTZ (3)
C
C ***********************************************************************
C ***********************************************************************
C
      DO 002 KA = 1, 90
      DO 002 KB = 1, 3
  002 DPX (KB, KA) = 0.0
      DO 004 KC = 1, 12
  004 DPST (KC) = 0.0
      IF (KDI) 006, 006, 005
  005 KDPST = KDI
      DPSTK = KDPST
      GO TO 007
  006 CALL DVD (
     1  CX, DPSTK, KDPST, MCX)
C                                        COMPUTE DPST INITIAL POSITIONS
C                                        INITIAL THICKNESS
  007 DPSTZ (1) = (CX(4, 1) - CX (3,1)) / DPSTK
C                                        INITIAL DPST BASE
      DPSTZ (2) = CX(3, 1) - 0.5 * DPSTZ (1)
```

```
      DO 080 KD = 1, MCX
      IF (CX (7, KD) - CX (6, KD)) 056, 056, 068
  056 DPX (1, KD) = 0.0
      GO TO 070
  068 DPX (1, KD) = (CX (7, KD) - CX (6, KD)) /
     1  (CX (4, KD) - CX (3, KD))
  070 IF (CX (6, KD)) 072, 072, 074
  072 DPX (2, KD) = 0.0
      GO TO 080
C
C     PATCH TO AVOID HANG UP BY DIVISION BY ZERO
C
   74 DENOM=CX(3,KD)-ZBRSTZ/3.28083
      IF(DENOM)75,72,75
   75 DPX(2,KD)=CX(6,KD)/DENOM
  080 CONTINUE
      RETURN
      END
$IBFTC SYSX    LIST,DECK,M94/2
      FUNCTION SYSTEM (
     1  J, NEQ, Y, CF)
C
C ***********************************************************************
C
C     SYSTEM FOR CLOUDRISE + PARTICLE GENERATION
C
C ***********************************************************************
C
      DIMENSION
     1  CF (40, 40), Y (40)
C
C ***********************************************************************
C
      CREATE =  0.0
      DSTROY = 0.0
      CREAT = 0.0
      IF(J-1) 99, 2, 1
  001 CREATE = Y (J - 1) * CF (J - 1, J - 1) * Y (J - 1) * 0.5
      IF(J-2) 2, 2, 3
  003 CREATE = CREATE + 0.75 * Y (J - 1) * CF (J - 1, J - 2) * Y (J - 2)
      IF(Y(J)) 99, 99, 6
6     JM = J-2
      DO 4 K = 1, JM
      IF(Y(K)) 4, 4, 40
40    CREAT = CREAT + CF(K,J)*Y(K)*2.**(K-J)
4     CONTINUE
      CREATE = CREATE + CREAT*Y(J)
2     IF(Y(J)) 99, 99, 7
 7    JM=MAX0(1,J-1)
      DO 5 K = JM , NEQ
      IF(Y(K)) 5, 5, 50
50    DSTROY = DSTROY + CF(J,K)*Y(K)
5     CONTINUE
      DSTROY = Y(J)*DSTROY
99    SYSTEM = CREATE - DSTROY
      RETURN
      END
$IBFTC TRPX    LIST,DECK,M94/2
      SUBROUTINE TRPL (
     1  ARG, MPR, PARA, PARB, VRB)
```

```
C                                                                       TRPX   3
C ***********************************************************************TRPX   4
C                                                                       TRPX   5
C      TRPL USES LINEAR INTERPOLATION TO LOCATE POSITION OF ARG WITHIN  TRPX   6
C      THE ONE-DIMENSIONAL ARRAY PARA AND COMPUTES FOR THE CORRESPONDING TRPX   7
C      POSITION IN THE ONE-DIMENSIONAL ARRAY PARB, VRB. NPR IS THE      TRPX   8
C      DIMENSION OF PARA AND PARB (WHOSE ELEMENTS CORRESPOND ONE TO ONE).TRPX   9
C      IF ARG IS OUTSIDE THE TABULATED VALUES OF PARA, VRB IS SELECTED  TRPX  10
C      FROM THE CORRESPONDING END OF PARB.                              TRPX  11
C      PARA IS ORDERED FROM LEAST (PARA (1)) TO GREATEST (PARA (NPR))   TRPX  12
C                                                                       TRPX  13
C ***********************************************************************TRPX  14
C                                                                       TRPX  15
       DIMENSION                                                        TRPX  16
     1  PARA (1), PARB (1)                                              TRPX  17
C                                                                       TRPX  18
C ***********************************************************************TRPX  19
C ***********************************************************************TRPX  20
C                                                                       TRPX  21
  020 IF (ARG - PARA (1)) 022, 022, 040                                 TRPX  22
  022 MB = 1                                                            TRPX  23
  024 VRB = PARB (MB)                                                   TRPX  24
  026 RETURN                                                            TRPX  25
  040 DO 054 MA =2, NPR                                                 TRPX  26
      IF (ARG - PARA (MA)) 048, 044, 054                                TRPX  27
  044 MB = MA                                                           TRPX  28
      GO TO 024                                                         TRPX  29
  048 VRB = (ARG - PARA (MA - 1)) * (PARB (MA) - PARB (MA - 1)) /       TRPX  30
     1  (PARA (MA) - PARA (MA - 1)) + PARB (MA - 1)                     TRPX  31
      GO TO 026                                                         TRPX  32
  054 CONTINUE                                                          TRPX  33
      MB = NPR                                                          TRPX  34
      GO TO 024                                                         TRPX  35
      END                                                               TRPX  36
$IBFTC UPVC    LIST,DECK,M94/2                                          UPVC   0
      SUBROUTINE UPVCS (                                                UPVC   1
     1  DNSTY, KS, NEQ, PVOL, RFD, RFM, RM, S, SALTD,                   UPVC   2
     2  SALTM, SZRO, T, TR, TSALT, V, VZRO, X, Y)                       UPVC   3
C                                                                       UPVC   4
C ***********************************************************************UPVC   5
C                                                                       UPVC   6
C      UPVCS TESTS AND, IF NECESSARY, UPDATES PARTICLE VOLUME           UPVC   7
C      FROM THE CONDENSATION OF SALT                                    UPVC   8
C                                                                       UPVC   9
C ***********************************************************************UPVC  10
C                                                                       UPVC  11
       DIMENSION                                                        UPVC  12
     1  Y (50)                                                          UPVC  13
C                                                                       UPVC  14
C ***********************************************************************UPVC  15
C ***********************************************************************UPVC  16
C                                                                       UPVC  17
  724 IF(TR-T) 725, 726, 726                                            UPVC  18
726   IF(S) 728, 728, 729                                               UPVC  19
728          S = (RFM + SALTM*.1)*(1.+X)/(RM-RFM)                       UPVC  20
729   CONTINUE                                                          UPVC  21
      GO TO ( 721, 725) , KS                                            UPVC  22
721          IF(TSALT-T) 725, 722, 722                                  UPVC  23
722   S = S*(RFM+SALTM)/(RFM+.1*SALTM)                                  UPVC  24
             DNSTY = RFD*SALTD*(RFM+SALTM)/(RFM*SALTD+RFD*SALTM)        UPVC  25
```

```
      PVOL = PVOL*(RFM*SALTD+RFD*SALTM)/(RFM*SALTD+.1*RFD*SALTM)          UPVC
          KS = 2                                                          UPVC
      IF(SZRO)  730, 730, 725                                             UPVC
730   CONTINUE                                                            UPVC
                VZRO = VZRO/V                                             UPVC
                DO 727 J = 1, NEQ                                         UPVC
727             Y(J) = Y(J)*VZRO                                          UPVC
  725 RETURN                                                              UPVC
      END                                                                 UPVC
$IBFTC LNK3    LIST,DECK,M94/2
      SUBROUTINE LINK3
      RETURN
      END
      RETURN
$IBFTC LNK4    LIST,DECK,M94/2                                            LNK4
C ***********************************************************************LNK4
C ***********************************************************************LNK4
C                                                                         LNK4
C              CLOUD RISE - TRANSPORT INTERFACE MODULE GLOSSARY           LNK4
C     29 MARCH 1967                                                       LNK4
C                                                                         LNK4
C     A(I)         MASS FRACTION OF THE TOTAL CLOUD SOIL BURDEN IN THE    LNK4
C                  I TH PARTICLE SIZE CLASS                               LNK4
C     ATEMP(I)     DYNAMIC VISCOSITY OF AIR AT (I-1)*200 METERS ABOVE MSL LNK4
C                  IN KILOGRAMS PER METER-SECOND                          LNK4
C     B            LINEAR MAGNIFICATION FACTOR FOR LARGE STRATUM CELLS    LNK4
C     BS           MAGNIFICATION FACTOR FOR CELLS OF THE STEM (SEE B)     LNK4
C     BS3          BS**3                                                  LNK4
C     BZ           EDGE LENGTH (METERS) OF A BASIC SQUARE BASED CLOUD CELLLNK4
C     B3           B**3                                                   LNK4
C     COL          NUMBER OF COLUMNS IN CROSS SECTION                     LNK4
C                  (BUFFERS ARE ADDED BY THE PROGRAM)                     LNK4
C     COLS         TEMPORARY STORAGE FOR COL OF THE STEM                  LNK4
C     COLX         NUMBER OF COLUMNS IN POSITIVE X AND Y DIRECTIONS IN THELNK4
C                  3-D CLOUD AND STEM FIRST QUADRANT                      LNK4
C                  (BUFFERS ARE ADDED BY THE PROGRAM)                     LNK4
C     CRID(J)      CLOUD RISE IDENTIFICATION CARD.  J=1,12                LNK4
C     DEL          SMOOTHING INCREMENT TO BE ADDED TO THE 3D MASS FRACTIONLNK4
C                  ARRAY FN(    ) FOR THOSE CELLS ADJOINING THE ONE CONTAINLNK4
C                  ING THE CENTER OF A ANNULAR CELL                       LNK4
C     DELM         MASS TO BE ADDED TO EACH CELL THAT AN INPUT PARTICLE OFLNK4
C                  SIZE ISIZE IS FOUND IN FOR THE CROSS SECTION           LNK4
C     DELPS        INCREMENT FOR THE MAGNIFIED NUMBER OF SIZE RANGES      LNK4
C                  WITHIN THE INPUT SIZE RANGE                            LNK4
C     DELZ         VERTICAL THICKNESS OF A SMALL CELL IN THE CAP/STEM     LNK4
C                  NEIGHBORS OF THE CELL INTO WHICH DELM IS PUT           LNK4
C     DENT         BCD NAME OF TAPE FROM CLOUD RISE PROGRAM, DENT = IRISE LNK4
C     DETID(J)     DETONATION IDENTIFICATION CARD.  J=1,12                LNK4
C     DM           MASS INCREMENT TO BE ADDED TO EACH OF THE NEAREST      LNK4
C     DPX(I)       FACTOR FOR UPWARD STEM DRIFT RATE FOR THE I-TH CLOUD   LNK4
C                  RISE TABLE ENTRY                                       LNK4
C     DX           HORIZONTAL GRID INTERVAL FOR THE 3-CLOUD               LNK4
C     DXS          HORIZONTAL GRID INTERVAL FOR THE 3-D CLOUD STEM        LNK4
C     DZ           VERTICAL GRID INTERVAL FOR THE CLOUD (BOTH CROSS       LNK4
C                  SECTION AND 3-D)                                       LNK4
C     FMAS(I)      FALLOUT MASS PER UNIT AREA OF CLOUD CELL BOTTOM        LNK4
C                  FOR THE I TH CELL        (KG/M**2)                     LNK4
C     FN(I,J,K)    3-D CLOUD AND STEM MASS FRACTION ARRAY.  J IS FOR THE XLNK4
C                  DIRECTION.  K IS FOR THE Y DIRECTION.  I IDENTIFIES ONLNK4
C                  OF 3 STRATUM ARRAYS OF WHICH THE ONE INDEXED BY I1 CON-LNK4
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C                   TAINS FINAL RESULTS AND THE OTHER TWO (INDEXED BY I2 ANLNK4  46
C                   I3) ARE CYCLED INTO FINAL RESULTS POSITION AS THE      LNK4  47
C                   PROGRAM STEPS DOWN THROUGH THE CLOUD(OR STEM)          LNK4  48
C                   (SEE BELOW STATEMENT 230)                              LNK4  49
C      FV           STILL AIR PARTICLE SETTLING RATE                       LNK4  50
C      FW           FISSION YIELD (KT)                                     LNK4  51
C      H            ONE HALF THE MAXIMUM VERTICAL THICKNESS OF THE CAP     LNK4  52
C      HOB          HEIGHT OF BURST (FEET) ABOVE GROUND ZERO               LNK4  53
C      IBUF         DIMENSIONED EXTENT OF OUTPUT PARTICLE DATA ARRAYS      LNK4  54
C      IC(J)        CONTROL INDICES.  J=1,18                               LNK4  55
C                      IC(3)=0  DO NOT PRINT LISTS OF PARTICLE OUTPUTS     LNK4  56
C                      IC(3)=1  PRINT COMPLETE LISTS OF PARTICLE OUTPUTSFORLNK4  57
C                               BOTH THE AXIALLY SYMMETRIC AND WIND        LNK4  58
C                               DISTORTED CLOUDS                           LNK4  59
C      II           STEM OR CLOUD INDICATOR.   1=STEM, 0=CLOUD             LNK4  60
C      IPARIN       NUMBER OF TAPE ON WHICH THE PARTICLE DATA FOR AN       LNK4  61
C                   AXIALLY SYMMETRIC CLOUD AND STEM ARE WRITTEN IN TRANS- LNK4  62
C                   PORTABLE FORM                                          LNK4  63
C      IPS(I)       PARTICLE SIZE RANGE INDEX OF THE I-TH INPUT PARTICLE   LNK4  64
C      IRING        COLUMN INDEX IN CROSS SECTION AND 3D CLOUD AND STEM    LNK4  65
C                   QUADRANT                                               LNK4  66
C      IRISE        LOGICAL NUMBER AND IDENTIFICATION NAME OF THE CLOUD    LNK4  67
C                   RISE MODULE OUTPUT TAPE                                LNK4  68
C      IROW         INDEX ON STRATA WITHIN CROSS SECTION (AND LARGE CELLS  LNK4  69
C                   OF THE 3D CLOUD AND STEM)                              LNK4  70
C      IRROR        NUMBER OF STATEMENT NEAR WHERE AN ERROR WAS DISCOVERED LNK4  71
C      ISIN         NUMBER OF SYSTEM INPUT TAPE                            LNK4  72
C      ISIZE        INDEX ON PARTICLE SIZE CLASS                           LNK4  73
C      ISOUT        NUMBER OF SYSTEM OUTPUT TAPE                           LNK4  74
C      I1           INDEX OF HIGHEST OF THE THREE STRATA REPRESENTED IN FN LNK4  75
C                   (SEE GLOSSARY DISCUSSION OF FN)                        LNK4  76
C      I2           INDEX OF MIDDLE STRATUM IN FN                          LNK4  77
C                   (SEE GLOSSARY DISCUSSION OF FN)                        LNK4  78
C      I3           INDEX OF BOTTOM STRATUM IN FN                          LNK4  79
C                   (SEE GLOSSARY DISCUSSION OF FN)                        LNK4  80
C      JJ           INDEX FOR PRINT OUT OF LAST 2 STRATA OF CLOUD/STEM     LNK4  81
C      JPARIN       LIKE IPARIN BUT FOR PARTICLE POSITIONS ADJUSTED FOR    LNK4  82
C                   TRANSPORT BY WINDS DURING CLOUD RISE                   LNK4  83
C      MHODO        NHODO-1                                                LNK4  84
C      MPOSIT       NPOSIT+1                                               LNK4  85
C      MPS          INPUT PARAMETER TO SPECIFY PARTICLE SIZE CLASS         LNK4  86
C                   MAGNIFICATION.  THE PARTICLE SIZE CLASS EXPANSION      LNK4  87
C                   FACTOR = MPS/(NPS-2)                                   LNK4  88
C      MX           SAME AS NX BUT FOR CROSS-SECTION                       LNK4  89
C      NAT          NUMBER OF ALTITUDE   STRATA IN THE ATMOSPHERE TABLES,  LNK4  90
C                     NAT=256                                              LNK4  91
C      NHODO        NUMBER OF ELEMENTS IN THE WIND HODOGRAPH               LNK4  92
C      NI           NUMBER OF SMALL CELLS IN EACH DIRECTION OF A LARGE CELLLNK4  93
C      NNX          INDEX FOR LARGE CELLS BEING PROCESSED IN X-DIRECTION   LNK4  94
C                   NNX=1,NX                                               LNK4  95
C      NNY          INDEX FOR LARGE CELLS BEING PROCESSED IN Y-DIRECTION   LNK4  96
C                   NNY=1,NY                                               LNK4  97
C      NP           NUMBER OF PARTICLE DESCRIPTIONS INPUT  FROM THE CLOUD  LNK4  98
C                   RISE MODULE                                            LNK4  99
C      NPOSIT       NUMBER OF TIME ENTRIES IN THE CLOUD RISE HISTORY TABLESLNK4 100
C                   CX (SEE DASA-1800-III)                                 LNK4 101
C      NPS          NUMBER OF PARTICLE SIZE RANGES REPRESENTED IN THE SET  LNK4 102
C                   OF NP INPUT PARTICLE DESCRIPTIONS                      LNK4 103
C      NSIZ         MAGNIFICATION FACTOR FOR EACH INPUT SIZE RANGE         LNK4 104
C      NSP          INDEX TO INDICATE AN OPTION A OR OPTION B CLOUD.   BOTHLNK4 105
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C                   CLOUDS ARE AXIALLY SYMMETRIC (BEFORE CORRECTION FOR    LNK4 106
C                   WIND DRIFT).  THEY DIFER  IN THAT AT ANY ALTITUDE LEVELLNK4 107
C                   (A) ANY HORIZONTAL PLANE THROUGH AN OPTION A CLOUD HAS LNK4 108
C                       A UNIFORM PARTICLE CONTENT BETWEEN THE CLOUD       LNK4 109
C                       BOUNDRIES.  A COMPLETE THREE-DIMENSIONAL PARTICLE  LNK4 110
C                       INPUT IS PROVIDED BY THE CLOUD RISE MODULE.        LNK4 111
C                   (B) FOR AN OPTION B CLOUD PARTICLE INPUTS ARE FOR A    LNK4 112
C                       SINGLE PLANE THAT CONTAINS THE CLOUD SYMMETRY AXIS.LNK4 113
C                       PARTICLE CONTENT CAN VARY IN THE HORIZONTAL        LNK4 114
C                       DIRECTION.  A THREE-DIMENSIONAL DISTRIBUTION OF    LNK4 115
C                       PARTICLES MUST BE GENERATED BY THIS  PROGRAM FROM  LNK4 116
C                       THE TWO DIMENSIONAL DISTRIBUTION THAT IS INPUT.    LNK4 117
C                                                                          LNK4 118
C                     NSP=1 FOR OPTION A                                   LNK4 119
C                     NSP=0 FOR OPTION B                                   LNK4 120
C                                                                          LNK4 121
C      NX           NUMBER OF GRID SQUARES IN THE +X AND +Y DIRECTIONS IN  LNK4 122
C                   THE 3-D CLOUD AND STEM INCLUDING BORDERS               LNK4 123
C      NZ           NUMBER OF STRATA IN THE 3-D CLOUD AND STEM AND CROSS SELNK4 124
C      ODX          COLUMN INTERVAL FOR CROSS SECTION                      LNK4 125
C      ODXS         COLUMN INTERVAL FOR CROSS SECTION OF STEM (SEE ODX)    LNK4 126
C      PACT(I)      LOW BOUNDARY PARTICLE DIAMETER   (MICRONS) OF THE I TH LNK4 127
C                   PARTICLE SIZE CLASS                                    LNK4 128
C      PNUM(I)      NUMBER OF INPUT PARTICLES IN I-TH SIZE RANGE           LNK4 129
C      PROGRM       BCD NAME OF PROGRAM                                    LNK4 130
C      PS(J)        CENTRAL PARTICLE DIAMETER (MICRONS) OF THE J TH        LNK4 131
C                   PARTICLE SIZE CLASS                                    LNK4 132
C      PSEID(J)     RUN IDENTIFICATION FOR THE CLOUD RISE - TRANSPORT      LNK4 133
C                   INTERFACE MODULE.    J=1,12                            LNK4 134
C      PSIZE(I)     SIZE OF PARTICLES IN CELL I WRITEN ON THE OUTPUT TAPES LNK4 135
C                   MAKING UP FMAS(I), IN MICRONS                          LNK4 136
C      R            MAX(XP(J)) FOR CLOUD PARTICLES                         LNK4 137
C      RADMAX       MAXIMUM CLOUD RADIUS (METERS)                          LNK4 138
C      RHO(I)       ATMOSPHERIC DENSITY AT (I-1)*200 METERS ABOVE MSL IN   LNK4 139
C                   KILOGRAMS PER CUBIC METER                              LNK4 140
C      ROPART       SOIL (PARTICLE) DENSITY IN KILOGRAMS PER CUBIC METER   LNK4 141
C      ROW          NUMBER OF STRATA THAT THE USER WISHES THE VOLUME CON-  LNK4 142
C                   TAINING INPUT PARTICLES TO BE DIVIDED INTO.            LNK4 143
C                   (BUFFERS ARE ADDED BY THE PROGRAM)                     LNK4 144
C      ROWS         TEMPORARY STORAGE FOR ROW OF THE STEM                  LNK4 145
C      RS           MAX(XP(J)) FOR STEM PARTICLES                          LNK4 146
C      RV           UPWARD COMPONENT OF VELOCITY OF A STEM PARTICLE        LNK4 147
C                   RESULVING FROM UPWARD STEM DRIFT                       LNK4 148
C      RX           RADIAL COORDINATE OF THE ANNULAR CELLS IN RING IRING   LNK4 149
C      SIGMA        BASE 10 LOG OF THE LOGNORMAL PARTICLE SIZE DISTRIBUTIONLNK4 150
C                   GEOMETRIC STANDARD DEVIATION                           LNK4 151
C      SIZ          NSIZ IN FLOATING POINT                                 LNK4 152
C      SLDTMP       SOLIDIFICATION TEMPERATURE (DEG. K) OF SOIL            LNK4 153
C      SSAM         MASS (KG) OF THE CLOUD SOIL BURDEN                     LNK4 154
C      SV(I)        RATIO OF SURFACE FRACTION TO VOLUME FRACTION OF CLOUD  LNK4 155
C                   PARTICLE BURDEN IN  THE I TH PARTICLE SIZE CLASS       LNK4 156
C      T            IRING IN FLOATING POINT                                LNK4 157
C      TC(I)        TIME(RELATIVE TO DETONATION OF)THE I-TH CLOUD RISE     LNK4 158
C                   TABLE ENTRY                                            LNK4 159
C      TCUR         PARTICLE TIME COORDINATE DURING A WIND DRIFT           LNK4 160
C                   ADJUSTMENT CALCULATION INCREMENT                       LNK4 161
C      TGZ          TIME OF DETONATION                                     LNK4 162
C      THET         ANGULAR COORDINATE INCREMENT BETWEEN SUCCESSIVE ANNULARLNK4 163
C                   CELL CENTERS.   ANGULAR EXTENT OF AN ANNULAR CELL      LNK4 164
C      THETA        ANGULAR COORDINATE (RADIANS) OF CENTER OF CURRENT      LNK4 165
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C                 ANNULAR CELL
C        TMSD     TIME(SEC) RELATIVE TO SHOT TIME AT WHICH THE CLOUD
C                 REACHED THE SOIL SOLIDIFICATION TEMPERATURE
C        TOP      ALTITUDE OF THE CLOUD TOP (METERS  ABOVE MSL)
C        TOPS     ALTITUDE OF THE STEM TOP (I.E., ALTITUDE OF THE
C                 CLOUD CAP BOTTOM) (METERS ABOVE MSL)
C        TP(I)    TIME OF DEFINITION (SEC) OF THE I TH CLOUD CELL
C        TW       TOTAL YIELD (KT)
C        V        GIVEN IRING, V IS THE NUMBER OF ANNULAR CELLS IN THE
C                 IRING-TH RING
C        VB(I)    CLOUD BOTTOM VEL.  OF THE I-TH CLOUD RISE TABLE ENTRY
C        VC(I)    VELOCITY ASSOCIATED WITH CLOUD AT ZC(I) AT TC(I).  I=1,
C                 NPOSIT
C        VI       NUMBER OF PARTS INTO WHICH A QUADRANT OF THE CENTRAL
C                 ANNULAR RING (CROSS SECTION CELL) IS TO BE DIVIDED
C                 WHEN CONVERTING THE CROSS SECTION INTO A 3-D CLOUD OR
C                 STEM
C        VT(I)    CLOUD TOP VELOCITY OF THE I-TH CLOUD RISE TABLE ENTRY
C        VX(I)    X VELOCITY OF WIND AT WIND HODOGRAPH STRATUM I
C        VY(I)    Y VELOCITY OF WIND AT WIND HODOGRAPH STRATUM I
C        X        INITIAL X COORDINATE FOR SMALL CELL COORDINATE
C                 CALCULATION
C        XGZ      X COORDINATE OF GROUND ZERO   (METERS)
C        XN(I,J)  VERTICAL CROSS SECTION ARRAY TO CONTAIN SMOOTHED
C                 FALLOUT MASS INCREMENTS DERIVED FROM THE INPUT
C                 PARTICLE DATA
C        XP(I)    HORIZONTAL COORDINATE (METERS) OF THE I TH INPUT
C                 PARTICLE RELATIVE TO THE CLOUD SYMMETRY AXIS.
C        XPAR(I)  X COORDINATE OF CELL I WRITEN ON THE OUTPUT TAPES
C                 (METERS)
C        XPR      CENTRAL DIAMETER (MICRONS) OF THE PARTICLE SIZE CLASS
C                 BEING TREATED
C        XPS      MIDPOINT IN MICRONS OF THE SIZE RANGE BEING CONSIDERED,
C                 AND THE SIZE OF THE 1ST SIZE RANGE WITHIN THAT INTERVAL
C                 WHICH THE INPUT SIZE RANGE IS BEING EXPANDED TO
C        XTEMP    TEMPORARY STORAGE OF THE X COORDINATE OF THE 1ST SMALL
C                 CELL WITHIN EACH LARGE CELL
C        XX       X COORDINATE OF CENTER OF CURRENT ANNULAR CELL,
C                 AND CURRENT SMALL CELL
C        Y        INITIAL Y COORDINATE FOR SMALL CELL COORDINATE
C                 CALCULATION
C        YGZ      Y COORDINATE OF GROUND ZERO (METERS)
C        YPAR(I)  Y COORDINATE OF CELL I WRITEN ON THE OUTPUT TAPES
C                 (METERS)
C        YTEMP    TEMPORARY STORAGE OF THE Y COORDINATE OF THE 1ST SMALL
C                 CELL WITHIN EACH LARGE CELL
C        YY       Y COORDINATE OF CENTER OF CURRENT ANNULAR CELL,
C                 AND CURRENT SMALL CELL
C        Z        Z COORDINATE OF THE CENTER OF A STRATUM IN THE 3-D
C                 CLOUD
C        ZB(I)    CLOUD BOTTON ALT.  OF THE I-TH CLOUD RISE TABLE ENTRY
C                 (METERS ABOVE MSL)
C        ZBRSTZ   ELEVATION OF GROUND ZERO(READ FROM TAPE IRISE IN
C                 FEET ABOVE MSL - CONVERTED TO METERS)
C        ZC(I)    CLOUD CENTER ALT.  OF THE I-TH CLOUD RISE TABLE ENTRY
C                 (METERS ABOVE MSL)
C        ZCUR     PARTICLE ALTITUDE AT THE BEGINNING OF A WIND DRIFT
C                 ADJUSTMENT CALCULATION INCREMENT
C        ZI       HEIGHT OF THE TOP BOUNDRY OF THE TOP (NUMERICALLY 1ST)
C                 STRATUM OF CAP/STEM
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C       ZP(I)       ALTITUDE OF I-TH INPUT PARTICLE.  METERS ABOVE MSL
C       ZPAR(I)     Z COORDINATE OF CELL I WRITEN ON THE OUTPUT TAPES
C                   (METERS ABOVE MSL)
C       ZT(I)       CLOUD TOP ALTITUDE OF THE I-TH CLOUD RISE TABLE ENTRY
C                   (METERS ABOVE MSL)
C       ZTEMP       TEMPORARY STORAGE OF THE Z COORDINATE OF THE 1ST SMALL
C                   CELL WITHIN EACH LARGE CELL
C       ZV(I)       ALTITUDE OF CENTER PLANE OF WIND HODOGRAPH STRATUM I
C                   (METERS ABOVE MSL)
C       ZZ          Z COORDINATE OF CURRENT SMALL CELL
C
C **********************************************************************
C **********************************************************************
C
        SUBROUTINE LINK4
C       CLOUD RISE - TRANSPORT INTERFACE MODULE MAIN PROGRAM
C       J. ZUCKERMAN,  T.W.SCHNENKE, H.G.NORMENT
C       29 MARCH 1967
C
        COMMON /SET1/
     1          DIAM    , FID    , IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2          SD      , SPAR   , SSAM   , TMB    , TMP1   , TMP2     ,
     3          T2M     , U      , VPR    , W      , X      , Z        ,
     4          WHY     , NDSTR  , IDISTR , SPAR1  , SPAR2  , SPAR3    ,
     5          SPAR4   , RMIN   , SPAR6  , SPAR7  , SPAR8  , SPAR9
        DIMENSION FID(12)
        DIMENSION WHY(40)
C **********************************************************************
C
C       THIS PROGRAM PREPARES INPUT FOR THE TRANSPORT MODULE.  IT CREATES
C       AN AXIALLY SYMMETRIC PARTICLE DATA SET ON TAPE JPARIN AND THEN
C       CALLS SUBROUTINE WNDSFT WHICH APPLIES WINDS FOR THE PERIOD OF
C       CLOUD RISE AND PUTS THE RESULTING DATA IN TRANSPORTABLE FORM ONTO
C       TAPE IPARIN.
C
C **********************************************************************
C
        DIMENSION CRID(12),DETID(12),PSEID(12),PS(200),A(200),ATEMP(260),
       1RHO(260),ZR(90 ),TC(90 ),VB(90 ),XP(800),ZP(800),IPS(800),IC(18),
       2ZV(200),VX(200),VY(200),PNUM(20),XN( 50, 50),FN(3,40,40),
       3ZPAR(200),XPAR(200),YPAR(200),PSIZ(200),TP(200),FMAS(200),
       4PACT(200),SV(200),ZT(90),VT(90)
C
C **********************************************************************
C
9111    FORMAT(1H1///51X,19H* * * * * * * * * *//13X,101HT H E   D E P A R T
       1 M E N T   O F   D E F E N S E   F A L L O U T   P R E D I C T I O
       2 N   S Y S T E M,//51X,19H* * * * * * * * * *////41X,39HCLOUD RISE
       3 - TRANSPORT INTERFACE MODULE///
       4                                55X,11HPREPARED BY/43X,34HTECHNICAL O
       5PERATIONS RESEARCH,INC.,/52X,17HBURLINGTON, MASS./////)
    1   FORMAT(//
       116X,2HFW,12X,4HSSAM,10X,6HSLDTMP,8X,4HTMSD,10X,5HSIGMA/
       210X,5(E13.6,1X)//
       316X,2HTW,12X,3HHOB,11X,2HBZ,12X,6HROPART,8X,3HNSP/
       410X,4(E13.6,1X),I13///
       510X,5HPSEID/10X,12A6//
       610X,4HCRID/10X,12A6//
       710X,5HDETID/10X,12A6///
       810X26HCONTROL ARRAY IC(J),J=1,18/10X,18I5///
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    910X22HDETONATION COORDINATES,10X,3HXGZ,13X,3HYGZ,13X,3HTGZ/
    134X,3(E13.6,3X)///)
  2  FORMAT(10X,3HMPS, 9X,2HVI,11X,1HH,10X,3HCOL, 9X,4HCOLS, 8X,3HROW,
    1 9X,4HROWS, 7X, 4HCOLX,9X, 1HB/
    2                  8X,I5,4X,8(E11.4,1X))
  3  FORMAT(1H1,9X, 29HWIND HODOGRAPH AT GROUND ZERO,10X,6HNHODO = I5//
    111X,22HVECTOR ALTITUDE, ZV(J),16X, 5HVX(J),24X,5HVY(J))
 3051 FORMAT(3(16X,F13.6))
 3052 FORMAT(1H0, 9X, 6HNPS = I5//16X, 13HPARTICLE SIZE,16X,13HMASS FRAC
    1TION, 21X,4HPACT, 24X,9HS-V RATIO)
 3053 FORMAT(4(16X,E13.6))
 3054 FORMAT(1H1, 9X,6HNAT = I5//18X,9HVISCOSITY,21X,3HRHO)
 3055 FORMAT(2(16X,E13.6))
 3056 FORMAT(1H1, 9X,7HNPOSIT=I5//10X,5HTC(J),13X,5HZB(J),13X,5HZT(J),
    1 13X,5HVR(J),13X,5HVT(J))
 3057 FORMAT(5(5X,E13.6))
 4    FORMAT(10X,5HXP(J),9X,5HYP(J),9X,5HZP(J),9X,5HTP(J),9X,7HPSIZ(J),
    17X,7HFMAS(J)/(5X,6(1X,F13.6)))
 1009 FORMAT(1X,A6,E13.6,I5)
 1011 FORMAT(12A6)
 1012 FORMAT(1X,6E13.5)
 1013 FORMAT(I5)
 1014 FORMAT(18I4)
 1015 FORMAT(3E13.6)
 1016 FORMAT(I5,4E13.6/4E13.6)
 1018 FORMAT(
    1                               15X, 2HXP,13X, 2HZP,12X, 3HIPS//
    2(7X,2(3X,E12.5),I10))
 1019 FORMAT(1X,2E13.6)
 1020 FORMAT(//29H  WRONG TAPE REEL ON DRIVE   I2,2X,41HPLEASE MOUNT COR
    1RECT TAPE AND PRESS START)
 3013 FORMAT( ///
    1          10X,14HBLOCK COUNT = I5// )
 3016 FORMAT(1X,I5,8E13.6)
C
C ******************************************************************
C ******************************************************************
C
      DATA DENTI,PROGRM/6HIPARIN,6HLINK4 /
      DATA CHECK /6H IRISE/
C     INITIALIZE
      NCL=0
      JJ=-1
      II=0
      ISIZE=2
      JPARIN=10
      IPARIN=11
      IBUF=200
C
C     PRINT OUTPUT HEADER
C
      WRITE(ISOUT,9111)
C
C     READ ALL DATA FROM CLOUD RISE TAPE
      REWIND IRISE
  997 READ (IRISE)DENT
C
C     CHECK TO SEE THAT THE CORRECT CLOUD RISE TAPE (IRISE) HAS BEEN
C     MOUNTED
      IF(CHECK.EQ.DENT) GO TO 999
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  998 PRINT 1020,IRISE
      WRITE (ISOUT,1020)IRISE
      REWIND IRISE
      PAUSE
      GO TO 997
  999 READ(IRISE)FW,SSAM,SLDTMP,TMSD,SIGMA,TW,HOB,BZ,ROPART,NSP,RADMAX
     1,ZBRSTZ
      ZBRSTZ=ZBRSTZ/3.28083
      READ (IRISE)(GRID(J),J=1,12)
      READ (IRISE)(DETID(J),J=1,12)
      READ (IRISE)NPS
      READ (IRISE)(PS(I),A(I),FACT(I),SV(I),I=1,NPS)
      READ (IRISE)NAT
      READ (IRISE)(ATEMP(I),RHO(I),I=1,NAT)
      READ (IRISE)NPOSIT
      READ(IRISE)(ZB(I),ZT(I),TC(I),VB(I),VT(I),I=1,NPOSIT)
      IF(NSP-1)2001,2000,2001
 2001 READ (IRISE)NP
      READ (IRISE)(XP(I),ZP(I),IPS(I),I=1,NP)
C
C     READ ALL DATA FROM THE SYSTEM INPUT TAPE
 2000 READ (ISIN,1011)(PSEID(J),J=1,12)
      READ (ISIN,1014)(IC(J),J=1,18)
      READ (ISIN,1015)XGZ,YGZ,TGZ
      IF(NSP-1)2004,2005,2004
 2004 READ (ISIN,1016)MPS,VI,H,COL,COLS,ROW,ROWS,COLX,B
 2005 READ (ISIN,1013)NHODO
      READ (ISIN,1015)(ZV(J),VX(J),VY(J),J=1,NHODO)
C
C     WRITE A HARD COPY OF ALL INPUTS
      WRITE (ISOUT,1) FW,SSAM,SLDTMP,TMSD,SIGMA,TW,HOB,BZ,ROPART,NSP,
     1(PSEID(J),J=1,12),(GRID(J),J=1,12),(DETID(J),J=1,12),(IC(J),J=1,
     218),XGZ,YGZ,TGZ
      IF(NSP-1)2006,2007,2006
 2006 WRITE (ISOUT,2)   MPS,VI,H,COL,COLS,ROW,ROWS,COLX,B
 2007 WRITE (ISOUT,3)NHODO
      WRITE(ISOUT,3051) (ZV(J),VX(J),VY(J),J=1,NHODO)
      WRITE(ISOUT,3052)NPS
      WRITE(ISOUT,3053)(PS(J),A(J),FACT(J),SV(J),J=1,NPS)
      WRITE(ISOUT,3054)NAT
      WRITE(ISOUT,3055)(ATEMP(J),RHO(J),J=1,NAT)
      WRITE(ISOUT,3056)NPOSIT
      WRITE(ISOUT,3057)(TC(J),ZB(J),ZT(J),VB(J),VT(J),J=1,NPOSIT)
      IF(NSP-1)2003,2002,2003
 2003 WRITE (ISOUT,3013)NP
      WRITE(ISOUT,1018)   (XP(I),ZP(I),IPS(I),I=1,NP)
C
C     CLEAR THE COUNTS OF INPUT PARTICLES BY SIZE RANGE
      DO 1000 I=1,NPS
 1000 PNUM(I)=0.0
C
C     FIND HIGHEST PARTICLE, COUNT PARTICLES IN EACH SIZE RANGE, FIND
C     MOST RADIALLY DISTANT PARTICLE OF CAP AND STEM
      R=XP(1)
      RS=XP(1)
      TOP=ZP(1)
      DO 1002 I=2,NP
      IF(ZP(I)-TOP)1002,1002,1001
 1001 TOP=ZP(I)
 1002 CONTINUE
```

```
C
C     ADD AN INCREMENT TO ASSURE TOP PARTICLE WILL BE WITHIN THE TOP ROW
C     OF CROSS SECTION
      TOP=TOP+0.0001
      TOPS=TOP-2.0*H
      DO 1008 I=1,NF
      IF(ZP(I)-TOPS)1003,1003,1005
 1003 IF(RS-XP(I))1004,1007,1007
 1004 RS=XP(I)
      GO TO 1007
 1005 IF(R-XP(I))1006,1007,1007
 1006 R=XP(I)
 1007 J=IPS(I)
      PNUM(J)=PNUM(J)+1.0
 1008 CONTINUE
C
C     ADD AN INCREMENT TO ASSURE THAT THE MOST RADIALLY DISTANT PARTICLE
C     WILL BE WITHIN THE LAST COLUMN OF THE CROSS SECTION
      R=R+0.0001
      RS=RS+0.0001
C
C     COMPUTE MAGNIFICATION FACTOR (NUMBER OF SMALL CELLS WITHIN EACH
C     LARGE CELL) FOR THE STEM, MAKE SURE THE HORIZONTAL DIMENSIONS OF
C     THE SMALL CELLS ARE EQUAL FOR THE CAP AND STEM, INITIALIZE
      TERM=R*(1.0+1.0/COLS)/(1.0+1.0/COL)
      BS=RS*TERM/R
      I=BS+0.5
      BS=I
      RS=R*BS/TERM
      ODX=R/COL
      ODXS=RS/COLS
      BZ=(R+ODX)/(COLX*B)
      B3=B**3
      BS3=BS**3
      VI=4.0*VI
      NCL=0
      DX=BZ*B
      NSIZ=NPS/(NPS-2)
      SIZ=NSIZ
      NI=B
      DXS=BZ*BS
C
C     CREATE THE BEGINNING OF THE SYMMETRIC CLOUD TAPE JPARIN
 2002 REWIND JPARIN
      WRITE (JPARIN)DENTI
      WRITE(JPARIN)FW,SSAM,SLDTMP,TMSD,SIGMA,TW,HOB,NSP,XGZ,YGZ,TGZ,BZ,
     1NCL,RADMAX
      WRITE (JPARIN)(PSEID(J),J=1,12)
      WRITE (JPARIN)(CRID(J),J=1,12)
      WRITE (JPARIN)(DFTID(J),J=1,12)
      WRITE (JPARIN)RCPART
      WRITE (JPARIN)NPS
      WRITE(JPARIN)(PS(J),A(J),PACT(J),SV(J),J=1,NPS)
      WRITE (JPARIN)NAT
      WRITE (JPARIN)(ATEMP(J),RHO(J),J=1,NAT)
      IF(NSP-1)5,2010,5
 2010 READ(IRISE)NP
      IF(NP)2011,2011,2012
 2011 NP=0
      IF(IC(3))2013,2013,2014
```

```
2013 WRITE(ISOUT,3013)NP
2014 WRITE(JPARIN)NP
     END FILE JPARIN
     REWIND JPARIN
     REWIND IRISE
     GO TO 2100
2012 READ(IRISE)(XPAR(I),YPAR(I),ZPAR(I),TP(I),PSIZ(I),FMAS(I),I=1,NP)
     WRITE(JPARIN)NP
     WRITE(JPARIN)(XPAR(I),YPAR(I),ZPAR(I),TP(I),PSIZ(I),FMAS(I),
    1                                                     I=1,NP)
     IF(IC(3))2015,2015,2010
2015 WRITE(ISOUT,3013)NP
     WRITE (ISOUT,4)
     WRITE(ISOUT,1012)(XPAR(I),YPAR(I),ZPAR(I),TP(I),PSIZ(I),FMAS(I),
    1I=1,NP)
     GO TO 2010
C
C    STEM BRANCH RETURN POINT (5)
C    ARE WE DOING STEM.  YES TO 20, NO TO 15, IF NEITHER, GENERAL ERROR
C    STOP
   5 IF(II)10,15,20
  10 IRROR=-5
7734 CALL ERROR(PROGRM,IRROR,ISOUT)
C
C    COMPUTE DZ, THE THICKNESS OF A STRATUM OF BIG CELLS FOR CAP/STEM,
C    ZI, THE HEIGHT OF THE TOP BOUNDARY OF THE TOP (NUMERICALLY 1ST)
C    STRATUM OF CAP/STEM,  MX, THE ADJUSTED NUMBER OF COLUMNS IN THE
C    CAP/STEM CROSS SECTION,   DELZ , THE VERTICAL THICKNESS OF A SMALL
C    CELL IN THE CAP/STEM
  15 DZ=2.0*H/ROW
     ZI=TOP+DZ
     GO TO 25
  20 DZ=(TOPS-ZBRSTZ)/ROW
     ZI=TOPS+DZ
  25 MX=COL+2.0
     DELZ=DZ/8
C
C    SIZE BRANCH RETURN POINT (30)
C    ARE THERE ANY PARTICLES IN SIZE RANGE ISIZE.  YES TO 32, NO TO 250
C    NEGATIVE TO GENERAL ERROR STOP
  30 IF(PNUM(ISIZE))31,250,32
  31 IRROR=-31
     GO TO 7734
C
C    INITIALIZE Z, THE Z COORDINATE OF THE CENTER OF A STRATUM IN THE
C    3-D CLOUD.   SET NZ, THE ADJUSTED NUMBER OF ROWS IN THE CROSS
C    SECTION OF THE CAP/STEM
  32 Z=ZI+DZ+DELZ/2.0
     NZ=ROW+2.0
C
C    CLEAR THE CROSS SECTION ARRAY OF MASS
     DO 35 IROW=1,NZ
     DO 35 IRING=1,MX
  35 XM(IRING,IROW)=0.0
C
C    COMPUTE MASS INCREMENTS FOR THE SMOOTHING  OPERATION.  DELM IS THE
C    MASS TO BE ADDED TO EACH CELL THAT AN INPUT PARTICLE OF SIZE ISIZE
C    IS FOUND IN.  UM IS THE MASS INCREMENT TO BE ADDED TO EACH OF THE
C    NEAREST NEIGHBORS OF THE ABOVE-MENTIONED CELLS
     DELM=0.5*A(ISIZE)/PNUM(ISIZE)
```

```
      DM=DELM/4.0
C
C     LOAD THE MASS OF ALL PARTICLES IN THE CAP/STEM OF SIZE RANGE ISIZE
C     INTO THE CROSS SECTION MASS ARRAY XN(IRING,IROW)
      DO 60 L=1,NP
      IF(II)40,40,45
   40 IF(ZP(L)-TOPS)60,60,50
   45 IF(TOPS-ZP(L)    )60,50,50
   50 IF(ISIZE-IPS(L))60,55,60
   55 IRING=XP(L)/ODX+2.0
      IROW=(ZI-ZP(L))/DZ+1.0
      XN(IRING,IROW)=XN(IRING,IROW)+DELM
      XN(IRING+1,IROW)=XN(IRING+1,IROW)+DM
      XN(IRING-1,IROW)=XN(IRING-1,IROW)+DM
      XN(IRING,IROW+1)=XN(IRING,IROW+1)+DM
      XN(IRING,IROW-1)=XN(IRING,IROW-1)+DM
   60 CONTINUE
C
C     ALL SELECTED PARTICLES HAVE BEEN LOADED.  NOW FOLD THE COLUMN TO
C     THE LEFT OF THE Z AXIS (COLUMN 1) INTO THE COLUM TO THE RIGHT OF
C     THE Z AXIS (COLUMN 2).
      DO 65 IROW=1,NZ
   65 XN(2,IROW)=XN(2,IROW)+XN(1,IROW)
C
C     AT THIS POINT XN(IRING,IROW) REPRESENTS THE TOTAL MASS IN THE
C     CROSS SECTIONAL CELL (IRING,IROW) AND ALSO IN THE SIZE RANGE ISIZE
C     SET NX, THE ADJUSTED NUMBER OF COLUMNS IN A QUADRANT OF THE 3-D
C     CLOUD
      NX=COLX+2.0
C
C     CLEAR THE 3 ARRAYS USED TO REPRESENT STRATA OF THE 3-D CLOUD
      DO 70 K=1,3
      DO 70 J=1,NX
      DO 70 I=1,NX
   70 FN(K,I,J)=0.0
C
C     INITIALIZE STRATUM ARRAY NUMBERS AND ROW INDEX ,IROW
      I1=1
      I2=2
      I3=3
      IROW=1
C
C     STRATUM BRANCH RETURN POINT (75)
C     BEGIN SMOOTHING THE CROSS SECTION MASSES INTO THE 3-D CLOUD ARRAYS
C     START WITH IRING = 2
   75 IRING=2
   80 T=IRING
C
C     COMPUTE V, THE NUMBER OF ANNULAR CELLS IN RING IRING
      V=(2.0*T-3.0)*VI
C
C     COMPUTE DEL, THE MASS INCREMENT TO BE ADDED TO THE NEAREST
C     NEIGHBORS OF THE 3-D CLOUD LARGE CELL INTO WHICH AN ANNULAR CELL
C     FALLS.  DEL IS ADJUSTED HERE TO ACCOUNT FOR THE LATER BREAKUP OF
C     THE LARGE CELLS INTO SMALL CELLS
      DEL=XN(IRING,IROW)/(12.0*V*B3*SIZ)
C
C     COMPUTE THE ANGULAR COORDINATE OF THE INITIAL ANNULAR CELL IN
C     RING IRING
      THETA=6.2831856/(2.0*V)
```

```
C
C     COMPUTE THE ANGULAR INCREMENT TO GET TO THE NEXT ANNULAR CELL
      THET=2.0*THETA
C
C     COMPUTE THE RADIAL COORDINATE OF THE ANNULAR CELL IN RING IRING
      RX=(T-1.5)*ODX
C
C     COMPUTE THE X AND Y COORDINATES , XX,YY, OF THE ANNULAR CELL IN
C     RING IRING
   85 XX=RX*COS(THETA)
      YY=RX*SIN(THETA)
C
C     COMPUTE THE INDICES OF THE LARGE CELL INTO WHICH THE ANNULAR CELL
C     FALLS
      L=XX/DX+2.0
      K=YY/DX+2.0
C
C     PUT THE PROPER AMMOUNT OF MASS INTO THE CELL WHOSE INDICES HAVE
C     JUST BEEN COMPUTED AND ITS NEAREST NEIGHBORS
      FN(I2,L,K)=FN(I2,L,K)+6.0*DEL
      FN(I2,L+1,K)=FN(I2,L+1,K)+DEL
      FN(I2,L-1,K)=FN(I2,L-1,K)+DEL
      FN(I2,L,K+1)=FN(I2,L,K+1)+DEL
      FN(I2,L,K-1)=FN(I2,L,K-1)+DEL
      FN(I1,L,K)=FN(I1,L,K)+DEL
      FN(I3,L,K)=FN(I3,L,K)+DEL
C
C     INCREMENT AND TEST THE ANGULAR COORDINATE TO SEE IF WE HAVE DONE
C     A QUADRANT.  YES TO 90, NO TO 85
      THETA=THETA+THET
      IF(1.5707964-THETA)90,90,85
C
C     HAVE WE DONE ALL THE RINGS.  YES TO 100, NO TO 95 WHERE WE
C     INCREMENT THE RING INDEX AND BEGIN AGAIN AT 80
   90 IF(MX-IRING)100,100,95
   95 IRING=IRING+1
      GO TO 80
C
C     FOLD 1ST ROW INTO 2ND, 1ST COLUMN INTO 2ND
  100 DO 105 I=1,NX
      FN(I1,2,I)=FN(I1,2,I)+FN(I1,1,I)
  105 FN(I1,I,2)=FN(I1,I,2)+FN(I1,I,1)
C
C     AT THIS POINT THE ARRAY FN( M,L,K),M=1,2,3, REPRESENTS THE TOTAL
C     MASS IN CELL (L,K) IN ROW  M OF A 3-D CLOUD QUADRANT.  WE NOW
C     INITIALIZE FOR THE SMALL CELL COORDINATE CALCULATION
  110 X=-BZ/2.0
      Y=X
      I=1
      NNX=2
      NNY=2
      XPS=(PS(ISIZE)+PS(ISIZE-1))/2.0
      DELPS=((PS(ISIZE+1)+PS(ISIZE))/2.0-XPS)/SIZ
      XPS=XPS+DELPS/2.0
      XTEMP=X+BZ
      YTEMP=Y+BZ
      ZTEMP=Z-DELZ
C
C     IS THERE ANY MASS IN THE LARGE CELL WE ARE CONSIDERING.  YES TO
C     115, NO TO 285 WHICH GOES ON TO NEXT CELL. IF NEGATIVE, GENERAL
```

```
C       ERROR STOP
  111 IF(FN(I1,NNX,NNY))112,205,115
  112 IRROR=-112
      GO TO 7734
C
C       BEGIN A LOOP ON THE NUMBER OF SIZE RANGES EACH INPUT SIZE RANGE
C       IS TO BE EXPANDED TO (115)
  115 DO 195 IIP=1,NSIZ
      IF(IIP-1)120,120,125
  120 XPR=XPS
      GO TO 130
  125 XPR=XPR+DELPS
C
C       BEGIN A LOOP ON THE NUMBER OF STRATA EACH LARGE CELL IS TO BE
C       BROKEN UP INTO (Z DIRECTION) (130)
  130 DO 195 IIK=1,NI
      IF(IIK-1)135,135,140
  135 ZZ=ZTEMP
      GO TO 145
  140 ZZ=ZZ-DELZ
C
C       BEGIN A LOOP ON THE NUMBER OF COLUMNS EACH LARGE CELL IS TO BE
C       BROKEN UP INTO (Y DIRECTION) (145)
  145 DO 195 IIJ=1,NI
      IF(IIJ-1)150,150,155
  150 YY=YTEMP
      GO TO 160
  155 YY=YY+BZ
C
C       BEGIN A LOOP ON THE NUMBER OF COLUMNS EACH LARGE CELL IS TO BE
C       BROKEN UP INTO (X DIRECTION) (160)
  160 DO 195 III=1,NI
      IF(III-1)165,165,170
  165 XX=XTEMP
      GO TO 175
  170 XX=XX+BZ
C
C       SET THE OUTPUT QUANTITIES XPAR(I), YPAR(I), ZPAR(I), PSIZE(I),
C       TP(I), FMASS(I), AND EXPAND THE SINGLE QUADRANT WE HAVE INTO 4
  175 ZPAR(I)=ZZ
      ZPAR(I+1)=ZZ
      ZPAR(I+2)=ZZ
      ZPAR(I+3)=ZZ
      XPAR(I)=XX
      XPAR(I+1)=-XX
      XPAR(I+2)=-XX
      XPAR(I+3)=XX
      YPAR(I)=YY
      YPAR(I+1)=YY
      YPAR(I+2)=-YY
      YPAR(I+3)=-YY
      PSIZ(I)=XPR
      PSIZ(I+1)=XPR
      PSIZ(I+2)=XPR
      PSIZ(I+3)=XPR
      TP(I)=TC(NPOSIT)
      TP(I+1)=TC(NPOSIT)
      TP(I+2)=TC(NPOSIT)
      TP(I+3)=TC(NPOSIT)
      FMAS(I)=FN(I1,NNX,NNY)
```

```
      FMAS(I+1)=FN(I1,NNX,NNY)
      FMAS(I+2)=FN(I1,NNX,NNY)
      FMAS(I+3)=FN(I1,NNX,NNY)
      I=I+4
C
C     ARE WE READY TO PRINT;  YES TO 180, NO TO 195
      IF(I-IBUF+3)195,195,180
  180 I=I-1
C
C     DO WE WANT OUTPUT ON THE SYSTEM OUTPUT TAPE. YES TO 185, NO TO 190
      IF(IC(3))185,185,190
  185 WRITE (ISOUT,3013)I
      WRITE (ISOUT,4)   (XPAR(J),YPAR(J),ZPAR(J),TP(J),PSIZ(J),FMAS(J),J
     1=1,I)
  190 WRITE (JPARIN)I
      WRITE (JPARIN)(XPAR(J),YPAR(J),ZPAR(J),TP(J),PSIZ(J),FMAS(J),J=1,I
     1)
      I=1
  195 CONTINUE
C
C     THE SMALL CELLS WITHIN A LARGE CELL HAVE BEEN DETERMINED.  PRINT
C     OUT ANY SMALL CELLS NOT AS YET ACCOUNTED FOR
      IF(I-1)205,205,200
  200 I=I-1
C
C     DO WE WANT OUTPUT ON THE SYSTEM OUTPUT TAPE. YES TO 201, NO TO 202
      IF(IC(3))201,201,202
  201 WRITE (ISOUT,3013)I
      WRITE (ISOUT,4)   (XPAR(J),YPAR(J),ZPAR(J),TP(J),PSIZ(J),FMAS(J),J
     1=1,I)
  202 WRITE (JPARIN)I
      WRITE (JPARIN)(XPAR(J),YPAR(J),ZPAR(J),TP(J),PSIZ(J),FMAS(J),J=1,I
     1)
      I=1
C
C     GO TO THE NEXT CELL IN THE X DIRECTION (205)
  205 NNX=NNX+1
C
C     HAVE WE DONE A WHOLE ROW IN THE X DIRECTION. YES TO 215, NO TO 210
C     WHERE WE INITIALIZE FOR THE NEW CELL AND TRANSFER TO 111
      IF(NNX-NX)210,210,215
  210 XPR=XPS
      XTEMP=XTEMP+DX
      GO TO 111
C
C     GO TO THE NEXT CELL IN THE Y DIRECTION (215)
  215 NNY=NNY+1
C
C     HAVE WE DONE A WHOLE ROW IN THE Y DIRECTION. YES TO 225, NO TO 220
C     WHERE WE INITIALIZE FOR THE NEW CE.   AND TRANSFER TO 111
      IF(NNY-NX)220,220,225
  220 XPR=XPS
      XTEMP=X+BZ
      YTEMP=YTEMP+DX
      NNX=2
      GO TO 111
C
C     GO TO THE NEXT STRATUM, INITIALIZE Z FOR THAT STRATUM. CLEAR THE
C     STORAGE ARRAY FN(I1,I,J),     CYCLE I1, I2, I3
  225 IROW=IROW+1
```

```
      Z=ZTEMP-DZ+DELZ
      DO 230 I=1,NX
      DO 230 J=1,NX
  230 FN(I1,I,J)=0.0
      I1=I2
      I2=I3
      I3=I1
C
C     HAVE WE DONE ALL STRATA IN THE 3-D CLOUD.  YES TO 235, NO TO 75
      IF(IROW-NZ)75,75,235
C     HAVE WE DONE THE LAST TWO ROWS OF THE STORAGE ARRAY FN. YES TO 250
C     THE LAST ONE TO 245, THE NEXT TO LAST TO 240
  235 IF(JJ)240,245,250
  240 JJ=JJ+1
      GO TO 110
  245 JJ=JJ+1
      GO TO 110
C
C
C     RESET THE STRATUM INDEX TO 1, THE LAST 2 STRATA INDEX TO -1,
C     INCREMENT THE SIZE RANGE
  250 IROW=1
      JJ=-1
      ISIZE=ISIZE+1
C
C     HAVE WE DONE ALL SIZES.  YES TO 255, NO TO 30
      IF(ISIZE-NPS+1)30,30,255
C
C     HAVE WE DONE THE STEM.  YES TO 265, NO TO 260
  255 IF(II)260,260,265
C
C     INITIALIZE FOR STEM CALCULATION AND RETURN TO 5
  260 II=II+1
      COL=COLS
      ODX=ODXS
      R=RS
      ROW=ROWS
      B=BS
      NI=B
      B3=BS3
      DX=DXS
      ISIZE=2
      GO TO 5
C
C     WRITE A ZERO ON THE STABILIZED CLOUD TAPE TO SIGNIFY ITS END
  265 N=0
C
  275 WRITE (JPARIN)N
      END FILE JPARIN
      REWIND JPARIN
C
C     CALL SUBROUTINE WNDSFT WHICH WILL SHIFT THE CLOUD IN ACCORDANCE
C     WITH THE PREVAILING WIND HODOGRAPH AND CREATE THE TAPE TO BE USED
C     AS INPUT TO THE TRANSPORT MODULE
 2100 CALL WNDSFT(IPARIN,JPARIN,ATEMP,RHO,TC,ZB,VB,ISOUT,NPOSIT,
     1VX,VY,ZV,ISIN, NHODO,PSIZ,ZPAR,XPAR,YPAR,TP,FMAS,XGZ,YGZ, TGZ,
     2 IC         FROG,      CRID,      PACT,NSP,ZT,VT,ZBRSTZ)
      RETURN
      END
$IBFTC WINSFX  LIST,DECK,M94/2
```

```
C     SUBROUTINE WNDSFT
C     J.ZUCKERMAN, T.W.SCHWENKE, H.G.NORMENT
C      19 JANUARY 1967
      SUBROUTINE WNDSFT(IPARIN,JPARIN,ATEMP,RHO,TC,ZB,VB,ISOUT,NPOSIT,
     1 VX,VY,ZV,ISIN , NHODO,PSIZ,ZPAR,XPAR,YPAR,TP,FMAS,XGZ,YGZ, TGZ,
     2 IC,FROG,CRID,PACT,NSP,ZT,VT,ZBRSTZ)
C
C *****************************************************************
C
C     THIS PROGRAM READS A TAPE (JPARIN) OF DATA WHICH DESCRIBE AN
C     AXIALLY SYMMETRIC STABILIZED CLOUD OF PARTICLES (IN TRANSPORTABLE
C     FORM) AND CONVERTS THE DATA TO REPRESENT A ASYMETRIC CLOUD THROUGH
C     THE APPLICATION OF A WIND HODOGRAPH AND A CLOUD RISE HISTORY.  THE
C     RESULT IS WRITTEN ONTO TAPE IPARIN IN TRANSPORTABLE FORM.
C
C **************************  GLOSSARY  ***************************
C
C     SEE THE CLOUD RISE - TRANSPORT INTERFACE MODULE GLOSSARY
C
C *****************************************************************
C
      DIMENSION CRID(12),XC(90 ),YC(90 ),PS(200),A(200),ATEMP(260),
     1RHO(260),ZC(90 ),TC(90 ),VC(90 ),IC(18),
     2ZV(200),VX(200),VY(200),
     3ZPAR(200),XPAR(200),YPAR(200),PSIZ(200),TP(200),FMAS(200),
     4PACT(200),SV(200),ZT(90),ZB(90),VB(90),VT(90),DPX(90)
C
C *****************************************************************
C
    1 FORMAT(1X,A6,I3,4E12.5,I5)
    2 FORMAT(///25X,16HCLOUD TRAJECTORY/6X,2HXC,12X,2HYC,12X,2HZC,12X,2H
     1TC,12X,2HVC/5(1X,E13.6))
    3 FORMAT(1X,6E13.5)
    4 FORMAT(1X,I5)
C
C *****************************************************************
C *****************************************************************
C
      DATA PROGRM/6HWNDSFT/
C
C     INITIALIZE
      REWIND IPARIN
      REWIND JPARIN
C
C     COMPUTE CLOUD CENTER  AND STEM DRIFT FACTOR ENTRIES IN RISE TABLE
C
      DO 25 I=1,NPOSIT
      ZC(I) = (ZB(I)+ZT(I))/2.0
      VC(I)=(VB(I)+VT(I))/2.0
      IF(VB(I))  21,21,22
 21   DPX(I) =0.0
      GO TO 25
   22 DENOMR= ZB(I)-ZBRSTZ
      IF(DENOMR)24,21,24
   24 DPX(I)=VB(I)/DENOMR
 25   CONTINUE
      NPOSIT = NPOSIT+1
      NHODO=NHODO-1
C
C     FIND HODOGRAPH VECTOR ALTITUDE APPROPRIATE FOR INITIAL TIME
```

```
      J=1
      K=1
   28 IF(ZC(1)-(ZV (J+1)+ZV(J))/2.0)  35,35,30
   30 IF(J-NHODO)  31,32,32
   31 J=J+1
      GO TO 28
   32 IRROR = -32
      GO TO 7734
C
C     COMPUTE HORIZONTAL DISPLACEMENTS VS. TIME FOR THE CLOUD BOTTOM
C     CENTER.
   35 XT=TC(1)*VX(J)
      YT=TC(1)*VY(J)
      XC(1)=XT
      YC(1)=YT
      TTEMP=TC(1)
      ZTEMP=ZC(1)
C
C 122 WHICH IS LOWER, NEXT CLOUD POSIT OR NEXT HODOGRAPH VECTOR
C
  122 IF(J.GE.NHODO) GO TO 124
      IF((ZV(J+1) + ZV(J))/2. -ZC(K+1))123,124,124
  123 DELT=((ZV(J+1)+ ZV(J))/2.- ZTEMP)/VC(K)
      ZTEMP= (ZV(J+1)+ZV(J))/2.
      TTEMP=TTEMP+DELT
      XT=XT+      VX(J)*DELT
      YT=YT+      VY(J)*DELT
      J=J+1
      GO TO 122
C
C     NEXT CLOUD CELL CENTER IS LOWER
  124 DELT=TC(K+1)-TTEMP
      TTEMP=TC(K+1)
      ZTEMP=ZC(K+1)
      XC(K+1)=XT+VX(J)*DELT
      YC(K+1)=YT+VY(J)*DELT
      XT=XC(K+1)
      YT=YC(K+1)
      K=K+1
      IF(K-NPOSIT)122,125,125
C
C 125 CLOUD TRAJECTORY IS COMPLETE
  125 WRITE (ISOUT,2)(XC(J),YC(J),ZC(J),TC(J),VC(J),J=1,NPOSIT)
C
C    COPY THE FIRST PART OF JPARIN ONTO IPARIN
      READ (JPARIN)DENTI
      WRITE (IPARIN)DENTI
C
      READ(JPARIN) FW,SSAM,SLDTMP,TMSD,SIGMA,TW,HOB,NSP,XGZ,YGZ,TGZ,BZ,
     1 NCL,RADMAX
      WRITE(IPARIN)FW,SSAM,SLDTMP,TMSD,SIGMA,TW,HOB,NSP,XGZ,YGZ,TGZ,BZ,
     1 NCL,RADMAX
      DO 100 I=1,3
      READ (JPARIN)(CRID(J),J=1,12)
  100 WRITE (IPARIN)(CRID(J),J=1,12)
C
      READ (JPARIN)ROPART
      READ (JPARIN)NPS
      READ (JPARIN)(PS(J),A(J),PACT(J),SV(J),J=1,NPS)
      READ (JPARIN)N
```

```
      READ (JPARIN)(ATEMP(J),RHO(J),J=1,N)
      WRITE (IPARIN)ROPART
      WRITE (IPARIN)NPS
      WRITE (IPARIN)(PS(J),A(J),PACT(J),SV(J),J=1,NPS)
      WRITE (IPARIN)N
      WRITE (IPARIN)(ATEMP(J),RHO(J),J=1,N)
C     SET ABRANCHING CONSTANT ACCORDING TO WHETHER AN OPTION A OR B
C     CLOUD IS SPECIFIED
      IF(NSP-1) 1510,1500,1510
 1500 NBRNCH=2
      GO TO 1520
 1510 NBRNCH=1
C
C     PRECOMPUTE A CONSTANT FOR FALL RATE COMPUTATION
 1520 FROG=1.3066667E-17*ROPART
C
C     AT THIS POINT WE ARE READY TO READ AND MODIFY THE PARTICLE
C     DISTRIBUTION DATA
C
C 104 READ AND TEST THE COUNT OF PARTICLES IN THE FORTHCOMING DATA
C     RECORD.  A ZERO COUNT INDICATES THE END OF THE DATA SET.
  104 READ (JPARIN)N
      IF(N)101,102,103
  101 IRROR=101
 7734 CALL ERROR (PROGRM,IRROR,ISOUT)
C
C 102 FINAL EXIT.  ALL DATA HAVE BEEN MODIFIED.  MARK IPARIN COMPLETED.
  102 N=0
      WRITE (IPARIN)N
      END FILE IPARIN
      REWIND JPARIN
      REWIND IPARIN
      RETURN
C
C 103 READ A BLOCK OF N PARTICLE DESCRIPTIONS
  103 READ (JPARIN)(XPAR(J),YPAR(J),ZPAR(J),TP(J),PSIZ(J),FMAS(J), J=1,N
     1)
C
C     NOW PREPARE TO SHIFT PARTICLES HORIZONTALLY IN ACCORDANCE WITH THE
C     POSITION OF THE CLOUD AT THE TIME WHEN THE PARTICLE LEFT THE CLOUD
C
C        FIRST INITIALIZE FOR ENTERING A LOOP ON PARTICLES
      OLDZ=-99999.0
      OLDPS=-1.0
      OLDT=-1.0
      J=1
C
C     IF THIS IS AN OPTION B CLOUD SET ANY PARTICLES BELOW GZ TO
C     ZBRSTZ AND  ANY PARTICLES AT OR BELOW GZ THAT ARE DEFINED AT OR
C     LATER THAN STABILIZATION TIME CANNOT BE CORRECTED FOR WIND DRIFT
C
  105 GO TO(1530,1560),NBRNCH
 1530 IF(ZPAR(J)-ZBRSTZ)1540,1550,1560
 1540 ZPAR(J)=ZBRSTZ
 1550 IF(TP(J)-TC(NPOST))1560,108,108
C
C1560 WAS THE CURRENT (J-TH) PARTICLE DEFINED AT THE SAME TIME AS THE
C     PREVIOUS ONE.    YES TO 1051
 1560 IF(TP(J)-OLDT)106,1051,106
C
```

```
C1051 IS THE CURRENT (J-TH) PARTICLE THE SAME SIZE AS THE PREVIOUS ONE.
C      YES TO 107
 1051 IF(PSIZ(J)-OLDPS)106,107,106
C
C 107 IS THE J-TH PARTICLE AT THE SAME ALTITUDE AS THE PREVIOUS ONE.
C      YES TO 108
 107  IF(ZPAR(J)-OLDZ)106,108,106
C
C 108 THE PARTICLE WILL HAVE THE SAME HORIZONTAL DISPLACEMENTS AS THE
C      PREVIOUS ONE AND WILL LEAVE THE CLOUD AT THE SAME TIME AND ALTI-
C      TUDE AS THE PREVIOUS ONE. ADDITION OF XGZ,YGZ MAKE XPAR,YPAR
C      RELATIVE TO COORDINATE SYSTEM ORIGIN
  108 TP(J)=TP(J)+TGZ
 109  XPAR(J)=XPAR(J)+DX+XGZ
      YPAR(J)=YPAR(J)+DY+YGZ
C
C      INCREMENT AND TEST J TO CONSIDER THE NEXT PARTICLE OR RETURN TO
C      FETCH THE NEXT BLOCK OF PARTICLE DATA.
      J=J+1
      IF(J-N)105,105,110
C
C 110 PUT THE MODIFIED DATA ON THE ASYMMETRIC CLOUD TAPE IPARIN AND THEN
C      RETURN TO FETCH THE NEXT DATA BLOCK
  110 WRITE (IPARIN)N
      WRITE (IPARIN)(XPAR(J),YPAR(J),ZPAR(J),TP(J),PSIZ(J),FMAS(J), J=1,
     1N)
      IF(IC(3))185,185,104
  185 WRITE (ISOUT,4)N
      WRITE (ISOUT,3)(XPAR(J),YPAR(J),ZPAR(J),TP(J),PSIZ(J), FMAS(J),J=1
     1,N)
  190 GO TO 104
 106  OLDPS=PSIZ(J)
      OLDZ=ZPAR(J)
      OLDT=TP(J)
C
C      DID J-TH PARTICLE LEAVE THE CLOUD.   NO TO 115
      IF(ZPAR(J)-ZB(NPOSIT))114,115,115
C
C 115 TAKE CARE OF PARTICLES THAT DONT LEAVE THE CLOUD
 115  DX=XC(NPOSIT)
      DY=YC(NPOSIT)
C      TP(J) AND ZPAR(J) ARE OK AS IS.
      GO TO 108
C
C 114 THE PARTICLE HAS LEFT THE CLOUD
C
  114 ZCUR=ZPAR(J)
      TCUR=TP(J)
      DX=0.
      DY=0.
C
C      LOCATE PARTICLE DEFINITION TIME IN THE CLOUD RISE TABLE.
C
      DO 210 K=1,NPOSIT
      LL=NPOSIT-K
      IF(TC(LL).LE.TP(J)) GO TO 221
  210 CONTINUE
  211 IRROR=-211
      GO TO 7734
C
```

```
C 221 LOCATE PARTICLE ALTITUDE IN THE WIND HODOGRAPH TABLE.
C
  221 DO 230 K=1,MHODO
      IF((ZV(K)+ZV(K+1))/2.0.GE.ZPAR(J))GO TO 240
  230 CONTINUE
      MM=NHODO
      GO TO 220
  240 MM=K
C
C 220 FIND CLOUD BOTTOM ALTITUDE AT THE PARTICLE DEFINITION TIME
C
  220 ZBOTOM= ZB(LL) +(TP(J)-TC(LL))*VB(LL)
      IF((ZBOTOM-ZCUR)-10.)1221,1221,250
 1221 DELTEE=0.
      LLL=LL
      MMM=MM
      GO TO 320
C
C    INDEX MMM IDENTIFIES THE WIND HODOGRAPH STRATUM IN WHICH THE
C     PARTICLE IS CURRENTLY DEFINED.
C
C     INDEX LL   IDENTFIES THE CLOUD RISE HISTORY TABLE ENTRY WHICH
C     REPRESENTS THE RISE INCREMENT DURNING WHICH THE PARTICLE IS
C     CURRENTLY DEFINED.
C
  250 MMM=MM
C
C     DETERMINE IF NET PARTICLE MOTION IS UPWARD OR DOWNWARD.
C                     UPWARD TO 251
C                     DOWNWARD TO 253
C
C
      CALL FALRAT (ZCUR,PSIZ(J),FV,ATEMP,RHO,FROG,ISOUT)
      RV= VB(LL) + (ZCUR-ZB(LL))*DPX(LL)
      IF(FV-RV .GE.0.0)GO TO 253
C
C 251 DETERMINE THE DIFFERENCE BETWEEN THE PARTICLE POSITION AND THE
C     BOTTOM OF THE HODOGRAPH STRATUM IN WHICH IT IS LOCATED.  THIS WILL
C     BE THE ALTITUDE INCREMENT OVER WHICH THE PARTICLE RISE WILL BE
C     COMPUTED NEXT.
C
 251  IF((MM-1).GT.0)  GO TO 252
      DELZEE=ZBRSTZ-ZCUR
      GO TO 270
 252  DELZEE=(ZV(MM)+ZV(MM-1))/2.0 - ZCUR
      MM=MM-1
      IF(DELZEE.LT.0.) GO TO 270
      MMM=MM
      GO TO 251
C
C 253 DETERMINE THE DIFFERENCE BETWEEN THE PARTICE AND EITHER THE CLOUD
C     BOTTOM OR THE BOTTOM OF THE NEXT HODOGRAPH STRATUM, WHICHEVER IS
C     CLOSEST.  THIS WILL BE THE ALTITUDE INCREMENT (DELZEE) OVER WHICH
C     THE PARTICLE FALL WILL BE COMPUTED NEXT.
C
 253  IF((ZV(MM+1)+ZV(MM))/2.0.LE.ZBOTOM )  GO TO 260
      DELZEE=ZBOTOM -ZCUR
      IF(DELZEE.LT.10.)DELZEE=0.0
      GO TO 270
  260 DELZEE=(ZV(MM+1)+ZV(MM))/2.0 -ZCUR
```

```
      MM=MM+1
      IF(DELZEE) 262,270,270
  262 IPROR=-262
      GO TO 7734
C
C     COMPUTE THE TIME OF PARTICLE FALL (DELTEE) OVER THE ALTITUDE
C     INCREMENT DELZEE.
C
  270 DELTEE=DELZEE/(FV-RV)
      IF (DELTEE)275,278,278
  275 IRPOR=-275
      GO TO 7734
  278 TMIUDT=TCUR-DELTEE
C
C     FIND THE POSITION OF TIME TMIUDT IN THE CLOUD RISE TABLE.
C
      LLL=LL
  280 IF(TC(LL).LE.TMIUDT) GO TO 290
      LL=LL-1
      IF(LL.GE.1) GO TO 280
      TMIUDT= TC(1)
C
C     COMPUTE THE CLOUD BOTTOM HEIGHT,ZBOTOM,AT THE TIME TMIUDT.
C
  290 ZBOTOM=ZB(LL)+VB(LL)*(TMIUDT-TC(LL))
C
C     IS THIS CLOUD BOTTOM ALTITUDE LESS THAN OR EQUAL TO THE PARTICLE
C     ALTITUDE-
C        YES TO 310 OR 320
C        NO  TO 300
C
      IF((ZBOTOM- ZCUR-DELZEE)-10. )310,320,300
C 300 INCREMENT PARTICLE SHIFT PARAMETERS
  300 DX=DX+VX(MMM) *DELTEE
      DY=DY+VY(MMM) *DELTEE
      TCUR=TCUR-DELTEE
      ZCUR=ZCUR+DELZEE
      GO TO 250
C
C
C 310 MAKE FINAL ADJUSTMENTS TO PARTICE SHIFT PARAMETERS.
C
C
  310 ZBOTOM=ZB(LLL)+VB(LLL)*(TCUR-TC(LLL))
      DELTEE=(ZBOTOM-ZCUR)/(VB(LLL)-RV+FV)
      IF(DELTEE.LT. 0.0)DELTEE=0.
  320 DELTRP =(TCUR -DELTEE-TC(LLL))/(TC(LLL+1) -TC(LLL))
  322 DX=DX+VX(MMM)*DELTEE + XC(LLL)  + (XC(LLL+1) -XC(LLL))*DELTRP
      DY=DY+VY(MMM)*DELTEE + YC(LLL)  + (YC(LLL+1) -YC(LLL))*DELTRP
      GO TO 108
C
      END
C
$IBFTC DUMPX    LIST,DECK,M94/2
      SUBROUTINE DUMPP
C         T.W.SCHWENKE  TECHNICAL OPERATIONS RESEARCH        SR  DUMPP
C     28 NOVEMBER 1966
C
C*********************************************************************
C
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C     THIS SUBROUTINE SELECTS THE BEST SET OF PARTICLES TO DUMP,
C     SORTS IT INTO THE LOW NUMBERED END OF THE PARTICLE ARRAYS, WRITES
C     IT OUT ONTO THE APPROPRIATE TAPE AND ADJUSTS PARTICLE SET COUNTERS
C     THE SET SELECTED FOR DUMPING IS THE GROUNDED PARTICLES SET WHEN-
C     EVER DUMPING IT WOULD MAKE SUFFICIENT ROOM FOR THE INCOMING BLOCK
C     OF N PARTICLES.  IF THIS IS NOT THE CASE, THE LARGEST PARTICLE SET
C     IS SELECTED.
C
C***********************  GLOSSARY  **********************************
C
C     FOR ADDITIONAL GLOSSARY ENTRIES SEE SUBROUTINE LINK5
C
C     FMAST   SEE XPT
C     IC( )   THE CONTROL INTEGER ARRAY.    SEE LINK 5 GLOSSARY
C     ICON    BLOCKING SORT MODE INDICATOR.  0=FIRST PASS, +=BOTTOM LOOP
C             ,-=TOP LOOP
C     IOTOPO  THE OFF-TOPO MEMORY TAPE NUMBER
C     IOWIND  THE OUT-OF-WIND DATA MEMORY TAPE NUMBER
C     IPAROT  THE TIME LIMIT BOUNDARY MEMORY TAPE NUMBER
C     IPOUT   THE TRANSPORT MODULE INTERMEDIATE OUTPUT TAPE NUMBER
C     IRSET   A MARKER FOR THE BLOCKING SORT WHICH INDICATES BY THE
C             VALUE  1  THAT THE TEMPORARY STORAGE LINE FOR A PARTICLE
C             IS LOADED AND MUST BE EVENTUALLY UNLOADED
C     ISOUT   THE FORTRAN SYSTEM OUTPUT TAPE NUMBER
C     J       A GENERAL INDEX.    IN THE BLOCKING SORT, IT IS USED TO
C             IDENTIFY THE PARTICLE THAT WAS JUST CLASSIFIED
C     JB      BOTTOM LOOP INDEX FOR THE BLOCKING SORT
C     JBL     BLANK LINE INDEX FOR THE BLOCKING SORT
C     JFR     USED TO RECORD THE INDEX OF A FREE (BLANK) LINE IN THE
C             BOTTOM PART OF THE PARTICLE ARRAY DURING THE CONSOLIDATION
C             OF N BLANKS INTO THE TOP OF THE ARRAY
C     JT      TOP LOOP INDEX FOR THE BLOCKING SORT
C     JTEST   A TEMPORARY STORAGE THAT EVENTUALLY CONTAINS THE NUMBER
C             OF PARTICLE DESCRIPTIONS IN THE CLASS TO BE DUMPED
C     JTEST1  A TEMPORARY STORAGE WHICH EVENTUALLY CONTAINS THE NUMBER
C             INDICATING THE KIND (CLASS) OF PARTICLE DESCRIPTION TO BE
C             DUMPED
C     N       THE NUMBER OF PARTICLES IN THE DATA BLOCK THAT IS WAITING
C             TO BE READ NEXT AT THE TIME WHEN DUMPP IS CALLED
C     NALOFT  THE DIMENSIONED (MAXIMUM) SIZE OF THE PARTICLE ARRAY
C     NBMAX   THE MAXIMUM NUMBER OF PARTICLE DESCRIPTIONS THAT CAN BE
C             INCLUDED IN A SINGLE BLOCK AS WRITTEN ON ANY MEMORY OR
C             INTERMEDIATE OUTPUT TAPE
C     NFREE   THE NUMBER OF BLANK LINES (DENOTED BY FMAS( )=0) IN THE
C             PARTICLE ARRAYS
C     NG      A COUNT OF IN-CORE GROUNDED PARTICLES
C     NLOST   A COUNT OF THE PARTICLES IN THE PARTICLE ARRAY BUT LOCATED
C             BEYOND THE COORDINATE LIMITS OF THE WIND OR TOPO DATA SETS
C     NTAP    A TEMPORARY STORAGE FOR THE NUMBER OF THE TAPE ONTO WHICH
C             THE DUMP IS TO BE MADE
C     NTI     A COUNT OF IN-CORE PARTICLES THAT HAVE REACHED THE TIME
C             BOUNDARY (ENDTIM)
C     NTO     A COUNT OF IN-CORE PARTICLES BEYOND THE IN-CORE TOPO DATA
C     NW      A COUNT OF IN-CORE PARTICLES BEYOND THE IN-CORE WIND DATA
C     N1      AN ASSIGNED GO TO BRANCH POINT FOR THE CLASSIFYING CODE
C     N2      SEE N1
C     N3      SEE N1
C     N4      SEE N1
C     PST     SEE XPT
C     TPT     SEE XPT
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C       XPT       TEMPORARY STORAGE FOR XP( ) SOMETIMES USED TO START A SORT
C       YPT       SEE XPT
C       ZPT       SEE XPT
C
C***********************************************************************
C
      COMMON /SET1/
     1         DIAM    ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2         SD      , SPAR    , SSAM   , TME    , TMP1   , TMP2     ,
     3         T2M     , U       , VER    , W      , X      , Z        ,
     4         WHY(40), RMIN     , IDISTR , SPAR1  , SPAR2  , SPAR3    ,
     5         SPAR4   , SPAR5   , SPAR6  , SPAR7  , SPAR8  , SPAR9
C
C **********************************************************************
C
      COMMON /SET2/
     1         S       , SUBSID , GRINT  , BXLL   , BXLU   , BYLL
     2,        BYLU    , TXLL   , TXLU   , TYLL   , TYLU   , XGZ
     3,        YGZ     , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM
     4,        KLIM    , II     , JJ     , KK     , XP     , YP
     5,        ZP      , FMAS   , TP     , PS     , VX     , VY
     6,        VZ      , IL     , JL     , IBADD  , WGRINT , NSTRAT
     7,        WLLX    , WLLY   , WURX   , WURY   , BOTHIT , IPARIN
     8,        IOTOPO  , IOWIND , IHTOPO , IPOUT  , IPAROT , JTOP1
     9,        JWIND1  , IRROR  , TLIMIT , ENDTIM , IC     , IBYPAS
     1,        JTOPJ   , NLOST  , NG     , NTO    , NTI    , NW
     2,        NALOFT  , JTIME1 , NBMAX  , NFREE  , N      , NCL
     3,        CRMAXY  , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY
     4,        UO      , SN     , CS     , NLOCIR , DTLOC  , ATEMP
     5,        RHO     , NA     , TGZ    , DTMAC  , FROG   , CRMAXX
     6,        ROPART
      DIMENSION TOPLLM(4,4)    ,NINTAR(4)      ,ITOPLM(3,4)
      DIMENSION S(10,10)       ,SUBSID(400)    ,IC(18)
      DIMENSION XP(200)        ,YP(200)        ,ZP(200)        ,FMAS(200)
      DIMENSION TP(200)        ,PS(200)        ,ATEMP(260)     ,RHO(260)
      DIMENSION VX(1500)       ,VY(1500)       ,VZ(1500)       ,IL(70)
      DIMENSION JL(70)         ,IBADD(70)      ,WURX(70)
      DIMENSION WGRINT(70)                     ,WLLX(70)       ,WLLY(70)
      DIMENSION WURY(70)       ,BOTHIT(70)     ,SN(6)          ,CS(6)
      DIMENSION CRMINX(6)      ,CRMAXX(6)      ,CRMINY(6)      ,CRMAXY(6)
      DIMENSION CRUHT(6)       ,NCRTYP(6)      ,UO(6)
C
C***********************************************************************
C
 1    FORMAT(1H1,4X17,15H LOST PARTICLES)
 2    FORMAT(/6X,2HXP,10X2HYP,10X,2HZP,10X,2HTP,10X,2HPS,8X,4HFMAS)
 3    FORMAT(1X,6E12.5)
 4    FORMAT(10I5)
 6    FORMAT(5X11HBEYOND TOPO)
 7    FORMAT(5X13HTIME BOUNDARY)
 8    FORMAT(5X11HBEYOND WIND)
 9    FORMAT(5X8HGROUNDED)
C
C **********************************************************************
C
      DATA PROGRM/6H DUMPP/
C
C***********************************************************************
C***********************************************************************
C
```

```
C     MUST ANY PARTICLES BE DUMPED TO MAKE ROOM FOR THE INCOMING BLOCK  DUMP 127
C     OF N PARTICLES OR TO CLEAR THE PARTICLE ARRAYS.  YES TO 151       DUMP 128
      IF(N-NFREE)150,150,151                                            DUMP 129
 150  JTEST=0                                                           DUMP 130
      GO TO 152                                                         DUMP 131
C                                                                       DUMP 132
C 151 WOULD DUMPING THE GROUNDED PARTICLES PROVIDE SUFFICIENT ROOM FOR  DUMP 133
C     THE BLOCK OF N INCOMING PARTICLE DESCRIPTIONS.  YES TO 1512       DUMP 134
 151  IF(NFREE+NG-N)1511,1512,1512                                      DUMP 135
C                                                                       DUMP 136
C 1512 PREPARE TO DUMP THE GROUNDED PARTICLE DESCRIPTIONS               DUMP 137
 1512 JTEST1=1                                                          DUMP 138
      JTEST=NG                                                          DUMP 139
      GO TO 18                                                          DUMP 140
C1511 DETERMINE WHICH SET OF PARTICLES TO DUMP                          DUMP 141
C     FIND THE IDENTIFIER (JTEST1) AND SIZE (JTEST) OF THE MOST         DUMP 142
C     NUMEROUS CLASS OF PARTICLES IN THE PARTICLE ARRAYS                DUMP 143
 1511 IF(NLOST-NG)10,11,11                                              DUMP 144
 10   JTEST=NG                                                          DUMP 145
      JTEST1=1                                                          DUMP 146
      GO TO 12                                                          DUMP 147
 11   JTEST=NLOST                                                       DUMP 148
      JTEST1=2                                                          DUMP 149
 12   IF(JTEST-NTO)13,14,14                                             DUMP 150
 13   JTEST=NTO                                                         DUMP 151
      JTEST1=3                                                          DUMP 152
 14   IF(JTEST-NTI)15,16,16                                             DUMP 153
 15   JTEST1=4                                                          DUMP 154
      JTEST=NTI                                                         DUMP 155
 16   IF(JTEST-NW)17,18,18                                              DUMP 156
 17   JTEST1=5                                                          DUMP 157
      JTEST=NW                                                          DUMP 158
C 18  AT THIS POINT JTEST HAS MAX(NG,NLOST,NTO,NTI,NW).                 DUMP 159
C     JTEST1 INDICATES THE KIND OF PARTICLE DESCRIPTION TO BE DUMPED    DUMP 160
C     SEE THE FOLLOWING CODE EXPLANATION FOR JTEST1=1 THRU 5            DUMP 161
C                                                                       DUMP 162
C     JTEST1    NAME OF            KIND OF PARTICLE DESCRIPTIONS        DUMP 163
C     VALUE     CLASS COUNTER      TO BE DUMPED ONTO TAPE               DUMP 164
C      1             NG              GROUNDED PARTICLES                 DUMP 165
C      2             NLOST           PARTICLES BEYOND THE AREAS FOR WHICH DUMP 166
C                                    BOTH TOPO AND WINDS HAVE BEEN SPEC-  DUMP 167
C                                    IFIED                              DUMP 168
C      3             NTO             PARTICLES BEYOND THE LIMITS OF THE   DUMP 169
C                                    TOPO DATA CURRENTLY AVAILABLE IN COREDUMP 170
C      4             NTI             PARTICLES THAT CANNOT BE VALIDLY     DUMP 171
C                                    TRANSPORTED FURTHER UNTIL THE WIND   DUMP 172
C                                    FIELD DESCRIPTION IS UPDATED       DUMP 173
C      5             NW              PARTICLES BEYOND THE LIMITS OF THE   DUMP 174
C                                    WIND DATA CURRENTLY AVAILABLE IN COREDUMP 175
C                                                                       DUMP 176
C     TEST TO SEE THAT JTEST HAS AN ACCEPTABLE VALUE.   UNACCEPTABLE TO DUMP 177
C     ERROR STOP AT 184                                                 DUMP 178
C                                                                       DUMP 179
 18   IF(JTEST)184,184,182                                              DUMP 180
 184  IRROR= 184                                                        DUMP 181
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)                                    DUMP 182
      GO TO 60                                                          DUMP 183
C                                                                       DUMP 184
C 182 IS THE SIZE (JTEST) OF THE SELECTED CLASS GREATER THAN THE MAXIMUMDUMP 185
C     ALLOWABLE OUTPUT BLOCK SIZE (NBMAX)).  YES TO 183.                DUMP 186
```

```
 182  IF(JTEST-NBMAX)181,181,183
C
C 183 RESET JTEST EQUAL TO THE MAXIMUM ALLOWABLE BLOCK SIZE SO THAT
C     ACCEPTABLE BLOCK SIZE WILL BE DUMPED.
 183  JTEST=NBMAX
C
C 181 MAKE ASSIGNMENTS FOR THE EFFICIENT CONTROL OF THE CODE THAT WILL
C     LATER BE USED TO CLASSIFY PARTICLE DESCRIPTIONS AS TO WHETHER
C     THEY ARE TO BE DUMPED, NOT TO BE DUMPED, OR MERELY BLANK.  ALSO
C     DECREASE THE APPROPRIATE CLASS COUNTER BY THE NUMBER OF DESCRIP-
C     TIONS ABOUT TO BE DUMPED (JTEST) AND MAKE AN APPROPRIATE SETTING
C     OF THE OUTPUT TAPE NAME NTAP.
C 181 GO TO THE APPROPRIATE SELECTION CODE
 181  GO TO (19,20,21,22,23),JTEST1
C
C 19  CODE TO MAKE ASSIGNMENTS FOR THE SELECTION OF GROUNDED PARTICLES.
C     GROUNDED PARTICLES ARE IDENTIFIED BY THE PATTERN  -,-  IN THE
C     SIGNS OF FMAS( ) AND TP( ) UNDER THE CONDITION THAT TP( )+TLIMIT
C     DOES NOT EQUAL ZERO.
C     DESCRIPTIONS OF GROUNDED PARTICLES ARE ALWAYS WRITTEN ONTO THE
C     TRANSPORT INTERMEDIATE OUTPUT TAPE IPOUT
 19   NG=NG-JTEST
      NTAP=IPOUT
      ASSIGN 300 TO N1
      ASSIGN 400 TO N3
      ASSIGN 42 TO N2
      ASSIGN 42 TO N4
      GO TO 99
C
C 20  CODE TO MAKE ASSIGNMENTS FOR THE SELECTION OF PARTICLES THAT ARE
C     LOST TO THE INVESTIGATION.   THESE PARTICLES ARE IDENTIFIED BY A
C     NEGATIVE FMAS( ) AND A TP( ) WHICH EQUALS TLIMIT, THE TIME WHEN
C     THE TRANSPORT OF PARTICLES IS TO CEASE.  LOST PARTICLES ARE MERELY
C     WRITTEN ONTO THE SYSTEM OUTPUT TAPE TO INFORM THE RESEARCHER OF
C     THEIR REMOVAL FROM THE TRANSPORT.
 20   NLOST=NLOST-JTEST
      NTAP=ISOUT
      ASSIGN 500 TO N1
      ASSIGN 42 TO N2
      GO TO 99
C
C 21  CODE TO MAKE ASSIGNMENTS FOR THE SELECTION OF PARTICLES THAT HAVE
C     GONE BEYOND THE IN-CORE TOPOGRAPHY.  THESE PARTICLES ARE IDENTI-
C     FIED BY A POSITIVE FMAS( ) AND A NEGATIVE TP( ).  THEY ARE
C     WRITTEN ONTO THE OFF-TOPO TAPE (IOTOPO) BUT IF USE OF IOTOPO HAS
C     BEEN SUPPRESSED (BY SETTING IC(2)=1),THEY ARE WRITTEN ONTO THE
C     SYSTEM OUTPUT TAPE INSTEAD.  THIS IS TO LET THE RESEARCHER KNOW
C     THAT HIS SUPPRESSION OF IOTOPO HAS LED TO A LOSS OF PARTICLES FROM
C     THE TRANSPORT PROCESS.
 21   IF(IC(2)-1)211,212,211
 212  NTAP=ISOUT
      GO TO 213
C 211 JTOP1=1 INDICATES THAT THE ONLY OFF-TOPO PARTICLES THAT REMAIN IN
C     THE TRANSPORT ARE THOSE THAT ARE IN CORE IN THE PARTICLE ARRAYS.
C
 211  JTOP1=1
      NTAP=IOTOPO
 213  NTO=NTO-JTEST
      ASSIGN 300 TO N2
      ASSIGN 100 TO N3
```

```
      ASSIGN 42 TO N4
      ASSIGN 42 TO N1
      GO TO 99
C
C 22  CODE TO MAKE ASSIGNMENTS FOR THE SELECTION OF PARTICLES THAT CAN
C     NOT BE TRANSPORTED FURTHER UNTIL THE WIND FIELD IS UPDATED.  THESE
C     PARTICLES ARE IDENTIFIED BY A POSITIVE FMAS( ) AND A TP( ) EQUAL
C     TO ENDTIM.  NORMALLY THEY ARE WRITTEN ON TAPE IPAROT,BUT WHEN THE
C     USER HAS SET IC(4)=1 TO SUPPRESS IPAROT, THEY ARE WRITTEN ON THE
C     SYSTEM OUTPUT TAPE TO NOTIFY THE USER.
 22   IF(IC(4)-1)221,222,221
 222  NTAP=ISOUT
      GO TO 223
C
C 221 JTIME1=1 INDICATES THAT THE ONLY OUT-OF-WIND PARTICLES THAT REMAIN
C     IN THE TRANSPORT ARE THOSE THAT ARE IN THE PARTICLE ARRAYS.
 221  JTIME1=1
      NTAP=IPAROT
 223  NTI=NTI-JTEST
      ASSIGN 600 TO N2
      ASSIGN 42 TO N1
      GO TO 99
C
C 23  CODE TO MAKE ASSIGNMENTS FOR THE SELECTION OF PARTICLES THAT ARE
C     BEYOND THE LIMITS OF THE WIND DATA CURRENTLY AVAILABLE IN CORE.
C     THESE PARTICLES ARE IDENTIFIED BY A NEGATIVE FMAS( ) AND  POSITIVE
C     TP( ).  NORMALLY THEY ARE WRITTEN ONTO TAPE IOWIND, BUT WHEN THE
C     USER HAS SET IC(3)=1 TO SUPPRESS IOWIND, THEY ARE WRITTEN ON THE
C     SYSTEM OUTPUT TAPE TO NOTIFY THE USER.
 23   IF(IC(3)-1)231,232,231
 232  NTAP=ISOUT
      GO TO 233
C
C 231 JWIND1=1 INDICATES THAT THE ONLY OUT-OF-WIND-FIELD PARTICLES THAT
C     REMAIN IN THE TRANSPORT ARE THOSE THAT ARE IN THE PARTICLE ARRAYS.
 231  JWIND1=1
      NTAP=IOWIND
 233  NW=NW-JTEST
      ASSIGN 300 TO N1
      ASSIGN 100 TO N4
      ASSIGN 42 TO N2
      ASSIGN 42 TO N3
C
C 99  INITIALIZE FOR BLOCKING SORT
 99   IRSET=0
      ICON=0
      JB=NALOFT
      JT=1
      J=JB
C
C     WRITE OUT A DUMP SUMMARY
      WRITE (ISOUT,4)JTEST,JTEST1,NFREE,NG,NLOST,NTO,NTI,NW
C     NOW BEGIN THE BLOCKING SORT
C 98  CLASSIFY THE JTH PARTICLE AS BLANK, TO BE DUMPED, OR NOT TO BE
C     DUMPED
 98   IF(FMAS(J))30,31,32
 30   GO TO N1,(300,500,42)
 32   GO TO N2,(42,300,500,600)
 300  IF(TP(J))33,35,35
 33   GO TO N3,(400,100,42)
```

```
 35     GO TO N4,(42,100)
 400    IF(TP(J)+ENDTIM)100,42,100
 500    IF(TP(J)-TLIMIT) 42,100,42
 600    IF(TP(J)-ENDTIM)42,100,100
C
C 31     BLANK     NOT TO BE DUMPED
 31     IF(ICON)422,901,424
C 42     NON-BLANK   NOT TO BE DUMPED
 42     IF(ICON)421,424,424
C 100        TO BE DUMPED
 100    IF(ICON)903,904,900
C
C       ICON=0     FIRST PASS
C       ICON=+1     BOTTOM LOOP
C       ICON=-1    TOP LOOP
C
C 900 MOVE THE JB-TH LINE TO THE BLANK LINE (JBL)
 900    XP(JBL)=XP(JB)
        YP(JBL)=YP(JB)
        ZP(JBL)=ZP(JB)
        TP(JBL)=TP(JB)
        PS(JBL)=PS(JB)
        FMAS(JBL)=FMAS(JB)
        JT=JT+1
        FMAS(JB)=0.0
        IF(JT-JTEST)901,901,1103
 901    JBL=JB
        ICON=-1
        J=JT
 902    JB=JB-1
        GO TO 98
C 904 STORE THE JB-TH PARTICLE IN TEMPORARY STORAGE AND SET IRSET=1 TO
C       INDICATE THAT IT MUST BE PUT BACK INTO THE PARTICLE ARRAYS AT THE
C       END OF THIS DUMP OPERATION.
 904    XPT=XP(JB)
        YPT=YP(JB)
        ZPT=ZP(JB)
        TPT=TP(JB)
        PST=PS(JB)
        FMAST=FMAS(JB)
        IRSET= 1
        FMAS(JB)=0.0
        GO TO 901
 903    JT=JT+1
        J=JT
        IF(JT-JTEST)98,98,110
 424    J=J-1
        JB=JB-1
        GO TO 1104
C
C 421 MOVE THE JT-TH LINE TO THE BLANK LINE (JBL)
 421    XP(JBL)=XP(JT)
        YP(JBL)=YP(JT)
        ZP(JBL)=ZP(JT)
        TP(JBL)=TP(JT)
        PS(JBL)=PS(JT)
        FMAS(JBL)=FMAS(JT)
 422    JBL=JT
 423    ICON=1
        J=JB
```

```
 1104 IF( JB-JTEST)110,110,98
 1103 JBL = JB
C 110 IS THE TEMPORARY STORAGE LOADED.    YES TO 1101
 110  IF(IRSET)1101,1102,1101
C
C 1101 REPLACE THE TEMPORARILY STORED PARTICLE IN THE BLANK LINE (JBL)
 1101 XP(JBL) = XPT
      YP(JBL) = YPT
      ZP(JBL) = ZPT
      TP(JBL) = TPT
      PS(JBL) = PST
      FMAS(JBL)=FMAST
 1102 CONTINUE
C
C     RESET KEYS OF PARTICLES BEING DUMPED JUST BEFORE PRINTING OR
C     DUMPING THEM
      DO 131 J=1,JTEST
      IF(FMAS(J))101,111,111
 101  FMAS(J)=-FMAS(J)
 111  IF(TP(J))121,131,131
 121  TP(J)=-TP(J)
 131  CONTINUE
C
C
C
C     NOW DUMP THE SELECTED DESCRIPTIONS
C 50  IF THE SYSTEM OUTPUT TAPE IS TO BE WRITTEN, FIRST SELECT AND
C     WRITE AN APPROPRIATE TITLE.
 50   IF(NTAP-ISOUT)52,51,52
C
C     IF THE PRINTING OF LOST PARTICLE DESCRIPTIONS IS TO BE SUPRESSED,
C     GO TO 54
 51   IF(IC(8).NE.0) GO TO 54
      WRITE (ISOUT,1)JTEST
      WRITE (ISOUT,2)
      GO TO (511,516,513,514,515),JTEST1
 511  WRITE (ISOUT,9)
      GO TO 516
 513  WRITE (ISOUT,6)
      GO TO 516
 514  WRITE (ISOUT,7)
      GO TO 516
 515  WRITE (ISOUT,8)
 516  WRITE (ISOUT,3)(XP(J),YP(J),ZP(J),TP(J),PS(J),FMAS(J),J=1,JTEST)
      GO TO 54
 52   WRITE (NTAP)JTEST
      IF(NTAP-IPOUT)252,155,252
 155  WRITE (NTAP)(XP(J),YP(J), TP(J),PS(J),FMAS(J),J=1,JTEST)
      GO TO 54
 252  WRITE (NTAP)(XP(J),YP(J),ZP(J),TP(J),PS(J),FMAS(J),J=1,JTEST)
      IF(IC(6)-1)54,2521,2521
 2521 WRITE (ISOUT,3)(XP(J),YP(J),ZP(J),TP(J),PS(J),FMAS(J),J=1,JTEST)
C
C 54  ADD THE NUMBER OF LINES JUST DUMPED TO THE NUMBER OF LINES EMPTY
C     PREVIOUSLY AND THEN ZERO OUT THE IDP OF THE LINES JUST DUMPED TO
C     AVOID DOUBLE COUNTING
 54   NFREE=NFREE+JTEST
      DO 541 J=1,JTEST
 541  FMAS(J)=0.0
C
```

```
      IF(NFREE-N)151,152,152
C
C 152 ARE THERE NOW ENOUGH CONTIGUOUS BLANK LINES IN THE TOP OF THE
C      PARTICLE ARRAY TO RECIEVE THE N PARTICLES THAT ARE WAITING TO BE
C      READ IN.  YES TO 6.
 152  IF(N-JTEST)60,60,154
C
C 154 CONSOLIDATE N BLANK LINES INTO THE TOP OF THE PARTICLE ARRAY
 154  JFR=NALOFT+1
      K=JTEST+1
      DO 56 J=K,N
      IF(FMAS(J))57,56,57
C 57  A PARTICLE MUST BE MOVED DOWN
 57   JFR=JFR-1
      IF(FMAS(JFR))58,59,58
 58   IF(JFR-JTEST)60,60,57
C 59  MOVE THE PARTICLE
 59   XP(JFR)=XP(J)
      YP(JFR)=YP(J)
      ZP(JFR)=ZP(J)
      TP(JFR)=TP(J)
      PS(JFR)=PS(J)
      FMAS(JFR)=FMAS(J)
      FMAS(J)=0.0
 56   CONTINUE
 60   RETURN
      END
$IBFTC RDTOP    LIST,DECK,M94/2
      SUBROUTINE RDTOPO (LB)
C     11 OCT 66
C     T. W. SCHWENKE   TECHNICAL OPERATIONS RESEARCH    SR  OUTPRO CHAIN
C     THIS SUBROUTINE MERELY READS ONE TOPO BLOCK INTO ARRAYS S AND
C     SUBSID. IT EXPECTS READ LIMITS TO BE IN COMMON WORDS II,JJ,KK.
C     ERROR EXIT IF BAD LIMITS
C
C ***********************************************************************
C
      COMMON /SET1/
     1          DIAM   , DETID  , IRISF  , IEXEC  , ISIN   , ISOUT    ,
     2          SD     , SPAR   , SSAM   , THE    , TMP1   , TMP2     ,
     3          T2M    , U      , VPR    , W      , X      , Z        ,
     4          WHY    , RMIN   , IDISTR , SPAR1  , SPAR2  , SPAR3    ,
     5          SPAR4  , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9
      DIMENSION  DETID(12),WHY(40)
C*
C ***********************************************************************
C
      COMMON /SET2/
     1          S      , SUBSID , GRINT  , BXLL   , BXLU   , BYLL   ,
     2,         BYLU   , TXLL   , TXLU   , TYLL   , TYLU   , XGZ    ,
     3,         YGZ    , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM   ,
     4,         KLIM   , II     , JJ     , KK     , XP     , YP     ,
     5,         ZP     , FMAS   , TP     , PS     , VX     , VY     ,
     6,         VZ     , IL     , JL     , IBADD  , WGRINT , NSTRAT ,
     7,         WLLX   , WLLY   , WURX   , WURY   , BOTHIT , IPARIN ,
     8,         IOTOPO , IOWIND , IHTOPO , IPOUT  , IPAROT , JTOP1  ,
     9,         JWIND1 , IRROR  , TLIMIT , ENDTIM , IC     , IBYPAS ,
     1,         JTOPJ  , NLOST  , NG     , NTO    , NTI    , NW     ,
     2,         NALOFT , JTIME1 , NBMAX  , NFREE  , N      , NCL    ,
     3,         CRMAXY , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY
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     4,        UO     , SN     , CS     , NLOCIR , DTLOC  , ATEMP        RDTO  33
     5,        RHO    , NA     , TGZ    , DTMAC  , FROG   , CRMAXX       RDTO  34
     6,        ROPART                                                    RDTO  35
      DIMENSION TOPOLM(4,4)   ,NINTAR(4)     ,ITOPLM(3,4)                RDTO  36
      DIMENSION S(10,10)      ,SUBSID(400)   ,IC(18)                     RDTO  37
      DIMENSION XP(200)       ,YP(200)       ,ZP(200)     ,FMAS(230)     RDTO  38
      DIMENSION TP(200)       ,PS(200)       ,ATEMP(260)  ,RHO(260)      RDTO  39
      DIMENSION VX(1500)      ,VY(1500)      ,VZ(1500)    ,IL(70)        RDTO  40
      DIMENSION JL(70)        ,IBADD(70)     ,WURX(70)                   RDTO  41
      DIMENSION WGRINT(70)                   ,WLLX(70)    ,WLLY(70)      RDTO  42
      DIMENSION WURY(70)      ,BOTHIT(70)    ,SN(6)       ,CS(6)         RDTO  43
      DIMENSION CRMINX(6)     ,CRMAXX(6)     ,CRMINY(6)   ,CRMAXY(6)     RDTO  44
      DIMENSION CRUHT(6)      ,NCRTYP(6)     ,UO(6)                      RDTO  45
C                                                                        RDTO  46
C **********************************************************************RDTO  47
C                                                                        RDTO  48
 9    FORMAT(33HOTOPO DATA TOO LARGE FOR PROGRAM.)                       RDTO  49
 11   FORMAT(35H0 INCORRECT TOPO TABLE OF CONTENTS.)                     RDTO  50
 100  FORMAT(10F10.3)                                                    RDTO  51
C                                                                        RDTO  52
C                                                                        RDTO  53
C **********************************************************************RDTO  54
C **********************************************************************RDTO  55
C                                                                        RDTO  56
      II=ITOPLM(1,LB)                                                    RDTO  57
      JJ=ITOPLM(2,LB)                                                    RDTO  58
      KK=ITOPLM(3,LB)                                                    RDTO  59
      TTOPO=TOPOLM(4,LB)                                                 RDTO  60
      BXLL=TOPOLM(1,LB)                                                  RDTO  61
      BXLU=TOPOLM(3,LB)*FLOAT(II)+BXLL                                   RDTO  62
      BYLL=TOPOLM(2,LB)                                                  RDTO  63
      BYLU=TOPOLM(3,LB)*FLOAT(JJ)+BYLL                                   RDTO  64
      JFTOPO=LB+1                                                        RDTO  65
      IF(II)1,1,2                                                        RDTO  66
 2    IF(JJ)1,1,3                                                        RDTO  67
 3    IF(KK)1,4,4                                                        RDTO  68
 4    IF(II-ILIM)5,5,6                                                   RDTO  69
 5    IF(JJ-JLIM)7,7,6                                                   RDTO  70
 7    IF(KK-KLIM)8,8,6                                                   RDTO  71
 6    WRITE (ISOUT,9)                                                    RDTO  72
 10   STOP                                                               RDTO  73
 1    WRITE (ISOUT,11)                                                   RDTO  74
      GO TO 10                                                           RDTO  75
 8    READ (IHTOPO)((S(I,J),I=1,II),J=1,JJ)                              RDTO  76
      READ (IHTOPO)(SUBSID(K),K=1,KK)                                    RDTO  77
      WRITE (ISOUT,100)(SUBSID(K),K=1,KK)                                RDTO  78
      RETURN                                                             RDTO  79
      END                                                                RDTO  80
      RETURN                                                             RDTO  79
$IBFTC LNK5     LIST,DECK,M94/2                                          LNK5   0
      SUBROUTINE LINK5                                                   LNK5   1
C          T.W.SCHWENKE  TECHNICAL OPERATIONS RESEARCH          LINK 5  LNK5   2
C   15 OCTOBER 1966                                                      LNK5   3
C    FIRST OVERLAY LINK OF TRANSPORT PROGRAM, INITIALIZATION AND CALL   LNK5   4
C      OF WIND FIELD PREPARING SUBROUTINE  MKWIND                        LNK5   5
C                                                                        LNK5   6
C **********************************************************************LNK5   7
C                                                                        LNK5   8
C************       TAPE IDENTIFICATIONS AND ASSIGNMENTS      *********** LNK5   9
C                                                                        LNK5  10
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C        NAME              CONTENT                                      LNK5
C                                                                       LNK5
C     IHTOPO            TOPOGRAPHIC HEIGHT DATA TAPE                    LNK5
C     IOTOPO            PARTICLES ALOFT BUT BEYOND IN CORE TOPOGRAPHY   LNK5
C     IOWIND            PARTICLES ALOFT BUT BEYOND IN CORE WIND FIELD   LNK5
C     IPARIN            PARTICLES ALOFT AND TO BE PROCESSED             LNK5
C     IPAROT            PARTICLES ALOFT AWAITING NEXT TIME PERIOD WINDS LNK5
C     IPOUT             PROGRAM SPECIFIC OUTPUT                         LNK5
C     ISOUT             SYSTEM (BCD) OUTPUT TAPE                        LNK5
C     ISIN              SYSTEM INPUT TAPE                               LNK5
C                                                                       LNK5
C************      PROGRAM GLOSSARY     ************                    LNK5
C                                                                       LNK5
C     ATEMP(J)          ATMOSPHERIC VISCOSITY IN THE J-TH STRATUM       LNK5
C     AX,AY,AZ          OUTPUT ARGUMENTS OF LOCAL CIRCULATION SYSTEM    LNK5
C                       CODES.  X,Y,AND Z COMPONENTS OF WIND AT THE     LNK5
C                       POSITION OF THE J-TH PARTICLE.                  LNK5
C     BLANK             BLANK LITERAL  (        )                       LNK5
C     BOTHIT(K)         ALTITIDE OF BOTTOM OF KTH WIND DATA BLOCK       LNK5
C     BZ                LENGTH OF THE SIDE OF THE SQUARE CLOUD SUBDIVIS-LNK5
C                       IONS AT THE TIME OF THEIR DEFINITION            LNK5
C     CBREZ1            SUBROUTINE    SEA BREEZE CIRCULATION MODEL      LNK5
C     CIRMIN            TIME UNTIL INTERSECTION WITH THE FIRST LOCAL    LNK5
C                       WIND SYSTEM                                     LNK5
C     CIRTYP(J)         THE LOCAL CIRCULATION TYPE OF THE JTH SYSTEM    LNK5
C             1      MOUNTAIN WIND 1                                    LNK5
C             2      RIDGE WIND 1                                       LNK5
C             3      SEA BREEZE 1                                       LNK5
C             4      SEA BREEZE 2                                       LNK5
C             5         NOT ASSIGNED                                    LNK5
C     CRID( )           CLOUD RISE IDENTIFICATION                       LNK5
C     CRMINX(J)         SMALLEST X COORDINATE OF THE JTH LOCAL SYSTEM   LNK5
C     CRMAXX(J)         LARGEST  X COORDINATE OF THE JTH LOCAL SYSTEM   LNK5
C     CRMINY(J)         SMALLEST Y COORDINATE OF THE JTH LOCAL SYSTEM   LNK5
C     CRMAXY(J)         LARGEST  Y COORDINATE OF THE JTH LOCAL SYSTEM   LNK5
C     CRUHT(K)       HEIGHT OF TOP SURFACE OF THE KTH LOCAL CIRCULATION LNK5
C                    SYSTEM CELL.                                       LNK5
C     DETID(J)          INITIAL CONDITIONS (FIREBALL) IDENTIFICATION    LNK5
C     DENTI             TOPOGRAPHY TAPE IDENTIFICATION LITERAL (IHTOPO) LNK5
C                       AS READ FROM TAPE                               LNK5
C     DENTT             PARTICLES ALOFT INPUT TAPE IDENTIFICATION       LNK5
C                       LITERAL AS READ FROM TAPE                       LNK5
C     DTLOC             TIME INCREMENT FOR USE IN TRANSPORT WITHIN LOCALLNK5
C                       CIRCULATION SYSTEM CELLS                        LNK5
C     DTMAC             TIME INCREMENT FOR USE IN TRANSPORT WITHIN THE  LNK5
C                       MACRO FIELD BUT BELOW MAXIMUM TOPOGRAPHIC HEIGHTLNK5
C     DTST              CANNED COPY OF PARTICLES ALOFT INPUT TAPE       LNK5
C                       IDENTIFICATION LITERAL (IPARIN)                 LNK5
C     DUMPP             SUBROUTINE     SELECTS AND DUMPS ONE OR MORE    LNK5
C                       SETS OF PARTICLE DESCRIPTIONS ONTO TEMPORARY,OR LNK5
C                       INTERMEDIATE OUTPUT TAPES.                      LNK5
C     ENDTIM            TIME UP TO WHICH THE CURRENT WIND FIELD DESCRIPTLNK5
C                       ION IS ASSUMED TO BE VALID.                     LNK5
C     EPSIL             A SMALL NUMBER                                  LNK5
C     ERROR             SUBROUTINE     ERROR COMMENT AND/OR STOP        LNK5
C     FALRAT            SUBROUTINE   PARTICLE SETTLING RATE COMPUTATION LNK5
C     FMAS(J)           MASS PER UNIT AREA (MKS) ASSOCIATED WITH THE    LNK5
C                       J-TH CLOUD SUBDIVISION (PARTICLE) AT THE TIME OFLNK5
C                       ITS DEFINITION                                  LNK5
C     FROG              A PRECOMPUTED CONSTANT INPUT FOR SUBROUTINE     LNK5
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C                            FALRAT                                            LNK5  71
C      FV                    OUTPUT ARGUMENT OF FALRAT (MKS)  A POSITIVE       LNK5  72
C                            QUANTITY                                          LNK5  73
C      FN                    FISSION YIELD                                     LNK5  74
C      GETWND                SUBROUTINE   GETS MACRO WIND VECTORS AT PARTICLELNK5  75
C                            POSITION                                          LNK5  76
C      H                     OUTPUT ARGUMENT OF SUBROUTINE HEIGHT              LNK5  77
C      HEIGHT                SUBROUTINE   RETRIEVES TOPO HEIGHT AT X,Y         LNK5  78
C      HOB                   HEIGHT OF BURST RELATIVE TO SURFACE HEIGHT        LNK5  79
C      HS                    TEMPORARY STORAGE FOR STANDARD ATMOSPHERIC        LNK5  80
C                            STRATUM BOTTOM HEIGHT                             LNK5  81
C      HTOPO                 HEIGHEST TOPO HEIGHT ANYWHERE ON THE TOPO TAPE    LNK5  82
C      HTST                  CANNED COPY OF TOPOGRAPHY TAPE IDENTIFICATION     LNK5  83
C                            LITERAL (IHTOPO)                                  LNK5  84
C      IBADD(K)              BASE ADDRESS OF KTH WIND DATA BLOCK IN ARRAYS     LNK5  85
C                       VX, VY, AND VZ                                         LNK5  86
C      IBYPAS                INITIALIZE BYPASS FLAG                            LNK5  87
C                                                                              LNK5  88
C      IC(J)                 CONTROL VARIABLES   INTERPRETATIONS AS FOLLOWS    LNK5  89
C         1                  SUPRESS TOPO TAPE USEAGE IF= 1                    LNK5  90
C         2                  SUPRESS OFF TOPO TAPE USEAGE IF = 1               LNK5  91
C         3                  SUPRESS OUT OF WIND FIELD TAPE USEAGE IF = 1      LNK5  92
C         4                  SUPRESS PARTICLES ALOFT SECONDARY MEMORY IF = 1 LNK5  93
C         5                  SUPRESS ALL TAPE SECONDARY MEMORY                 LNK5  94
C         6                  TRANSPORT TRACE CONTROL.  0 = NO TRACES,          LNK5  95
C                            1 = A PARTIAL TRACE,  2 =  A MORE COMPLETE TRACELNK5  96
C         7                  PRINT WIND FIELD IF  = 1                          LNK5  97
C         8                  SUPRESS PRINT AND WRITE OF LOST PARTICLES IF = 1LNK5  98
C                                                                              LNK5  99
C                                                                              LNK5 100
C      IEXEC                 EXECUTIVE CONTROL WORD TO CONTROL BRANCHING       LNK5 101
C                            BETWEEN CHAIN LINK SUBROUTINES                    LNK5 102
C      IF                    INDEX OF THE LAST LINE IN THE PARTICLE ARRAYS     LNK5 103
C      II                    ITOPLM(1,J) FOR THE TOPO DATA BLOCK CURRENTLY INLNK5 104
C                            CORE                                              LNK5 105
C      IL(K)                 LIMITS ON INDICES OF WIND BLOCK DATA SET K        LNK5 106
C      ILIM                                                                    LNK5 107
C      IPAS                  ASSIGNED GO TO VARIABLE FOR USE IN DEALING WITH LNK5 108
C                            EXCESSIVELY SMALL PARTICLE MOVEMENTS ARISING      LNK5 109
C                            DURING TRANSPORT                                  LNK5 110
C      IR                    INDICATOR OF TYPE OF BOUNDING PLANE ENCOUNTERED LNK5 111
C                            DURING TRANSPORT.  1=X-BOUNDARY, 2=Y-BOUNDARY,    LNK5 112
C                            3=Z-BOUNDARY, 4= TIME BOUNDARY, 5= LOCAL CIRC-    LNK5 113
C                            ULATION CELL BOUNDARY.                            LNK5 114
C      IRROR                 NUMBER OF THE SOURCE STATEMENT NEAREST TO WHERE LNK5 115
C                            AN ERROR CONDITION WAS SENSED.                    LNK5 116
C                            THAT IS TO BE PROCESSED BY THE TRANSPORT LOOP     LNK5 117
C      IT                    ASSIGNED GO TO VARIABLE FOR USE IN CODE SELECT- LNK5 118
C                            ION REGARDING USE OF PLANAR OR PIECEWISE PLANAR LNK5 119
C                            TOPOGRAPHIC DESCRIPTION.                          LNK5 120
C      ITOPLM(1,J)           NUMBER OF CELLS IN THE X DIRECTION OF THE         LNK5 121
C                            REGULAR GRID SECTION OF THE J-TH TOPO DATA BLOCKLNK5 122
C      ITOPLM(2,J)           SEE ITOPLM(1,J)  BUT FOR Y-DIRECTION              LNK5 123
C      ITOPLM(3,J)           NUMBER OF ENTRIES IN THE ONE-DIMENSIONAL SUB-     LNK5 124
C                            SIDIARY TOPOGRAPHIC DATA ARRAY FOR THE J-TH       LNK5 125
C                            DATA BLOCK                                        LNK5 126
C      IT7                   SEE IT.                                           LNK5 127
C      JDONE                 IF 1, INDICATES THAT THE ONLY PARTICLES THAT RE-LNK5 128
C                            MAIN TO HAVE THEIR TRANSPORT COMPLETED ARE        LNK5 129
C                            CURRENTLY IN CORE MEMORY.  NONE ARE ON THE TIME LNK5 130
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C                                   BOUNDARY TAPE.
C      JFTOPO                       INDICATOR OF TOPO TAPE FILE POSITION
C                                   THIS WORD RECORDS THE NUMBER OF THE FILE
C                                   WHICH A READ COMMAND WOULD BRING IN NEXT.
C      JJ                           ITOPLM(2,J) FOR THE TOPO DATA BLOCK CURRENTLY IN
C                                   CORE
C      JL(K)
C      JLIM
C      JTEST                        TEMPORARY STORAGE
C      JTEST1
C               +1                  THE TIME BOUNDARY TAPE IS IN USE
C                0                  NO TIME BOUNDARY PARTICLES ARE ON TAPE
C               -1                  USED ONLY TO CAUSE AN ENTRANCE TO MAIN TRANSPORT
C                                   LOOP WITHOUT FIRST  READING MORE PARTICLES FROM
C                                   TAPE.  THUS  ALL TRANS PORTABLE PARTICLES
C                                   REMAINING IN CORE ARE TRANSPORTED JUST AFTER A
C                                   NEW WIND FIELD HAS BEEN COMPUTED.
C      JTEST2                       TEMPORARY STORAGE
C      JTIME1                       INDICATES THE PRESENCE OF PARTICLES ON THE TIME
C                                   BOUNDARY TAPE
C                                   +1 INDICATES THAT THE TIME BOUNDARY TAPE IS IN
C                                   USE.   0 INDICATES THAT IT IS NOT IN USE.
C                                   -1 INDICATES THAT THERE ARE TIME BOUNDARY
C                                   PARTICLES IN CORE.  -1 IS USED TO CAUSE AN
C                                   ENTRANCE TO THE MAIN LOOP WITHOUT FIRST
C                                   READING MORE PARTICLES IN SO AS TO TRANSPORT
C                                   ALL TRANSPORTABLE PARTICLES THAT REMAIN IN
C                                   MEMORY JUST AFTER A NEW WIND FIELD IS COMPUTED.
C      JTOPJ                        INDEX OF HIGHEST WIND LAYER.  SET BY MKWIND OR
C                                   LINK 6
C      JTOP1                        FLAG FOR PARTICLES OFF THE IN CORE TOPO GRID
C      JW                           USED BY LINK7 AND SUBROUTINES AS AN INDEX OF THE
C                                   WIND STRATUM CONTAINING A PARTICLE
C      JWAD                         INDEX OF MACRO WIND CELL CONTAINING PARTICLE
C      JWAD1                        TEMPORARY STORAGE FOR PRECEEDING VALUE OF JWAD
C      JWIND1                       FLAG FOR PARTICLES OUT OF IN CORE WIND SPEC
C      KLIM                         LIMITS ON INDICES OF TOPO ARRAYS
C      KK                           ITOPLM(3,J) FOR THE TOPO DATA BLOCK CURRENTLY IN
C                                   CORE
C      LOTRAN                       SUBROUTINE    LOCAL SYSTEM PARTICLE TRANSPORT
C                                   CODE
C      MXTOPO                       MAX. NO. TOPO BLOCK CAPABILITY OF PROGRAM
C      MPNT                         USED TO CONTROL THE AMOUNT OF TRANSPORT TRACE
C                                   PRINTING IN LINK 7.  1=NO PRINTING, 2=PRINT ALL
C                                   TRACES.
C      MTWND1                       SUBROUTINE    MOUNTAIN WIND CIRCULATION MODEL
C      N                            NUMBER OF PARTICLE DESCRIPTIONS ABOUT TO BE READ
C                                   FROM THE CURRENT BLOCK OF THE PARTICLES INPUT
C                                   TAPE
C      NA                           NUMBER OF ATMOSPHERIC LEVELS DESCRIBED IN THE
C                                   TABLES OF STANDARD ATMOSPHERIC DENSITY AND
C                                   VISCOSITY
C      NALOFT                       SIZE OF ARRAY FOR PARTICLES ALOFT
C      NBLCK                        NUMBER OF BLOCKS OF TOPO DATA ON TOPO TAPE
C      NBMAX                        SIZE LIMIT ON DUMP BLOCK
C      NCIR                         TEMPORARY STORAGE FOR NCRTYP(J)
C      NCL                          SPARE
C      NCRTYP(J)                    LOCAL CIRCULATION TYPE IDENTIFIER OF THE J-TH
C                                   LOCAL SYSTEM.  1 IS MTWND1, 2 IS RGWND1, 3 IS
C                                   CBREZ1, OTHERS ARE UNASSIGNED.
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C       NFREE           NUMBER OF EMPTY LINES IN PARTICLES ALOFT LIST   LNK5 191
C       NG              NUMBER OF PARTICLES GROUNDED        (IN CORE)   LNK5 192
C       NINTAR(J)       NUMBER OF PARTICLES OVER TOPO AREA J AND IN     LNK5 193
C                       THE OUT-OF-TOPO BUFFER                          LNK5 194
C       NLOCIR          THE NUMBER OF LOCAL CIRCULATION SYSTEMS IN USE  LNK5 195
C       NLOST           NUMBER OF PARTICLES THAT DRIFTED BEYOND LIMITS  LNK5 196
C       NPS             NUMBER OF PARTICLE SIZE RANGES DESCRIBED IN THE LNK5 197
C                       PARTICLE SIZE DISTRIBUTION ARRAYS               LNK5 198
C       NSP             SPARE                                           LNK5 199
C       NSTRAT          MAXIMUM NUMBER OF ATMOSPHERIC STRATUM DESCRIPT- LNK5 200
C                       IONS THAT THE PROGRAM CAN ACCOMODATE            LNK5 201
C       NTI             NUMBER OF PARTICLES AT TIME BARRIER  (IN CORE)  LNK5 202
C       NTO             NUMBER OF PARTICLES AT TOPO BARRIER  (IN CORE)  LNK5 203
C       NUL             INTEGER ZERO                                    LNK5 204
C       NW              NUMBER OF PARTICLES AT WIND BARRIER  (IN CORE)  LNK5 205
C       N1,N2           ASSIGNED GO TO VARIABLES FOR USE IN SPEEDING UP LNK5 206
C                       THE COMPUTATION OF TIME OF FLIGHT TO LOCAL CIRC-LNK5 207
C                       ULATION SYSTEM CELL BOUNDARIES.                 LNK5 208
C       POUT            CANNED COPY OF GROUNDED PARTICLES TAPE IDENT-   LNK5 209
C                       IFIER LITERAL (IPOUT )                          LNK5 210
C       PROGRM          CONTAINS PROGRAM NAME IN BCD                    LNK5 211
C       PS(J)           MID-RANGE PARTICLE SIZE (MICRONS) OF THE J-TH   LNK5 212
C                       PARTICLE SIZE RANGE DESCRIBED IN THE PARTICLE   LNK5 213
C                       SIZE DISTRIBUTION ARRAYS                        LNK5 214
C       PSEID           PARTICLE SET EXPANSION  PROGRAM OF INTERFACE    LNK5 215
C                       PROGRAM RUN IDENTIFICATION                      LNK5 216
C       PSIZE           TEMPORARY STORAGE FOR PARTICLE SIZE OF CURRENT  LNK5 217
C                       PARTICLE                                        LNK5 218
C       RADMAX          MAXIMUM CLOUD RADIUS DURING CLOUD RISE          LNK5 219
C       RDTOPO          SUBROUTINE  READS IN A TOPO DATA BLOCK          LNK5 220
C       RGWND1          SUBROUTINE    RIDGE WIND CIRCULATION MODEL      LNK5 221
C       RHO(J)          ATMOSPHERIC DENSITY IN THE J-TH TABULATED       LNK5 222
C                       STRATUM                                         LNK5 223
C       ROPART          FALLOUT PARTICLE DENSITY (MKS)                  LNK5 224
C       RTST            TEMPORARY STORAGE                               LNK5 225
C       SIGMA           STANDARD DEVIATION OF PARTICLE SIZE DISTRIBUTIONLNK5 226
C       SLDTMP          PARTICLE SOLIDIFACATION TEMPERATURE (K)         LNK5 227
C                                                                       LNK5 228
C       SSAM            MASS OF CONDENSED PHASE MATERIAL AT SPECIFICAT- LNK5 229
C                       ION TIME                                        LNK5 230
C       TC              TEMPORARY STORAGE                               LNK5 231
C       TGZ             TIME OF DETONATION                              LNK5 232
C       TID( )          TRANSPORT IDENTIFICATION                        LNK5 233
C       TIX,TIY,TIZ     TIMES OF FLIGHT TO THE FIRST X,Y,AND Z MACRO    LNK5 234
C                       CELL BOUNDING PLANES                            LNK5 235
C       TLIMIT          TIME SPECIFIED FOR THE TERMINATION OF TRANSPORT LNK5 236
C       TMAXX,TMAXY     TEMPORARY STORAGE FOR LARGEST OF (TX1,TX2) AND  LNK5 237
C                       (TY1,TY2)                                       LNK5 238
C       TMINX,TMINY     TEMPORARY STORAGE FOR SMALLEST OF (TX1,TX2) AND LNK5 239
C                       (TY1,TY2) RESPECTIVELY                          LNK5 240
C       TMSD            TIME OF SOLIDIFICATION                          LNK5 241
C       TOPID(J)        TOPOGRAPHY IDENTIFIER                           LNK5 242
C       TOPOLM          FLOATING POINT TOPOGRAPHIC DATA ARRAY           LNK5 243
C       TOPOLM(1,J)     MIN. X-COORDINATE FOR J-TH TOPO DATA BLOCK      LNK5 244
C       TOPOLM(2,J)     MIN. Y-COORDINATE FOR J-TH TOPO DATA BLOCK      LNK5 245
C       TOPOLM(3,J)     INITIAL (REGULAR) GRID INTERVAL FOR J-TH TOPO   LNK5 246
C                       DATA BLOCK                                      LNK5 247
C       TOPOLM(4,J)     HEIGHEST TOPO HEIGHT IN THE J-TH TOPO DATA BLOCKLNK5 248
C       TP              PARTICLE TIME STATUS                            LNK5 249
C       TS              TIME OF FLIGHT TO POINT OF ENTRANCE TO CURRENT  LNK5 250
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C                       LOCAL WIND CELL
C      TTOPO            HEIGHEST TOPO ELEVATION IN THE IN CORE DATA
C      TW               TOTAL YIELD
C      TWND             TIME OF FLIGHT TO TIME BOUNDARY
C      TXLL,TXLU,TYLL,  LOWER AND UPPER X AND Y COORDINATE LIMITS FOR
C      TX1,TX2          TIMES OF FLIGHT TO THE TWO X-PLANES BOUNDING THE
C                       CURRENT LOCAL CIRCULATION CELL.
C      TYLU             THE AREA ACCOUNTED FOR ON THE TOPOGRAPHY TAPE
C      TY1,TY2          SEE TX1 BUT FOR Y-PLANES
C      VPX,VPY          TEMPORARY STORAGE FOR X AND Y PARTICLE VELOCITY
C      VPZ              NET VERTICAL VELOCITY OF PARTICLE
C      VPZT             TEMPORARY STORAGE FOR PRECEEDING VALUE OF VPZ
C      VX, VY, VZ       WIND VELOCITY COMPONENTS
C      WGRINT(K)        GRID INTERVAL OF KTH WIND DATA BLOCK
C      WID(J)           WIND FIELD DESCRIPTION IDENTIFICATION
C      WLLX(K)          HORIZONTAL LIMITS OF KTH WIND DATA BLOCK
C      WURY(K)          HORIZONTAL LIMITS OF KTH WIND DATA BLOCK
C      X,Y              TEMPORARY STORAGE FOR PARTICLE COORDINATES
C      XBL,XBU          LOWER AND UPPER X COORDINATES OF MACRO CELL CON-
C                       TAINING PARTICLE
C      XGZ,YGZ          COORDINATES OF GROUND ZERO
C      XIN,YIN,ZIN      X,Y,AND Z INCREMENTAL DISTANCES FOR USE IN
C                       CONSTANT TIME INTERVAL STEPPING BELOW MAXIMUM
C                       TOPO HEIGHT.
C      XP, YP, ZP       PARTICLE POSITION COORDINATES
C      XX,YY,ZZ         TEMPORARY STORAGE FOR X,Y,AND Z PARTICLE COORDIN
C                       ATES
C      YBL,YBU          SEE XBL,   FOR Y COORDINATE
C
C ***********************************************************************
      COMMON /SET1/
     1        DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2        SD     , SPAR    , SSAM   , THF    , TMP1   , TMP2     ,
     3        T2M    , U       , VPR    , W      , X      , Z        ,
     4        WHY(40), RMIN    , IDISTR , SPAR1  , SPAR2  , JDONE    ,
     5        SPAR4  , SPAR5   , SPAR6  , SPAR7  , SPAR8  , SPAR9
C
C ***********************************************************************
C
      COMMON /SET2/
     1       S      , SUBSID , GRINT  , BXLL   , BXLU   , BYLL
     2,      BYLU   , TXLL   , TXLU   , TYLL   , TYLU   , XGZ
     3,      YGZ    , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM
     4,      KLIM   , II     , JJ     , KK     , XP     , YP
     5,      ZP     , FMAS   , TP     , PS     , VX     , VY
     6,      VZ     , IL     , JL     , IBADD  , WGRINT , NSTRAT
     7,      WLLX   , WLLY   , WURX   , WURY   , BOTHIT , IPARIN
     8,      IOTOPO , IOWIND , IHTOPO , IPOUT  , IPAROT , JTOP1
     9,      JWIND1 , IRROR  , TLIMIT , ENDTIM , IC     , IBYPAS
     1,      JTOPJ  , NLOST  , NG     , NTO    , NTI    , NW
     2,      NALOFT , JTIME1 , NBMAX  , NFREE  , N      , NCL
     3,      CRMAXY , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY
     4,      UO     , SN     , CS     , NLOCIR , DTLOC  , ATEMP
     5,      RHO    , NA     , TG7    , DTMAC  , FROG   , CRMAXX
     6,      ROPART
      DIMENSION TOPOLM(4,4)    ,NINTAR(4)      ,ITOPLM(3,4)
      DIMENSION S(10,10)       ,SUBSID(400)    ,IC(18)
      DIMENSION XP(200)        ,YP(200)        ,ZP(200)        ,FMAS(200)
      DIMENSION TP(200)        ,PS(200)        ,ATEMP(260)     ,RHO(260)
      DIMENSION VX(1500)       ,VY(1500)       ,VZ(1500)       ,IL(70)
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      DIMENSION JL(70)         ,IBADD(70)     ,WURX(70)                    LNK5 311
      DIMENSION WGRINT(70)                    ,WLLX(70)     ,WLLY(70)      LNK5 312
      DIMENSION WURY(70)       ,BOTHIT(70)    ,SN(6)        ,CS(6)         LNK5 313
      DIMENSION CRMINX(6)      ,CRMAXX(6)     ,CRMINY(6)    ,CRMAXY(6)     LNK5 314
      DIMENSION CRUHT(6)       ,NCRTYP(6)     ,U0(6)                       LNK5 315
C                                                                          LNK5 316
C ************************************************************************LNK5 317
C                                                                          LNK5 318
      DIMENSION CRID(12)       ,PSEID(12)     ,TID(12)                     LNK5 319
      DIMENSION WID(12)        ,TOPID(12)                                  LNK5 320
 1    FORMAT(12A6)                                                         LNK5 321
 2    FORMAT(///25X,56H****  INITIAL CONDITIONS (FIREBALL) IDENTIFICATIOLNK5 322
     1N  ****/25X,12A6,//25X,37H****  CLOUD RISE IDENTIFICATION  ****/25LNK5 323
     2X,12A6,//25X,49H****  PARTICLE SET EXPANSION IDENTIFICATION  **** LNK5 324
     3     /25X,12A6//25X,83H****  THIS RUN OF THE TRANSPORT MODULE WAS LNK5 325
     4GIVEN THE FOLLOWING IDENTIFICATION  ****/25X,12A6///25X,28H****  OLNK5 326
     5THER INPUT DATA  ****)                                               LNK5 327
 3    FORMAT(18X,12A6)                                                     LNK5 328
 4    FORMAT(I5                                                            LNK5 329
 5    FORMAT(2F1  5)                                                       LNK5 330
 6    FORMAT(1H1,24X,48HATMOSPHERIC PROPERTIES FOR FALL RATE CALCULATIONLNK5 331
     1//25X16HHEIGHT OF BOTTOM4X,9HVISCOSITY12X,7HDENSITY/26X10HOF STRATLNK5 332
     2UM/25X16HMETERS ABOVE MSL6X5H(MKS)15X5H(MKS)//)                     LNK5 333
 7    FORMAT(/15X71HTHE CONTROL VARIABLE ARRAY, IC(J), HAS BEEN GIVEN THLNK5 334
     1E FOLLOWING VALUES.)                                                 LNK5 335
 8    FORMAT(15X,18I4)                                                     LNK5 336
 9    FORMAT(/15X28HTHE TRANSPORT TIME LIMIT IS F12.3)                     LNK5 337
 10   FORMAT(18X63H IN THIS RUN WE ASSUME A PLANAR DEPOSITION SURFACE ATLNK5 338
     1 ELEVATIONF10.3)                                                     LNK5 339
 11   FORMAT(42H0PARTICLES REMAINING ON TIME BOUNDARY TAPE)                LNK5 340
 12   FORMAT(6(1X,E13.6))                                                  LNK5 341
 13   FORMAT(A6,4F10.3,I3)                                                 LNK5 342
 14   FORMAT(29H0 WRONG TAPE REEL ON DRIVE   I2)                           LNK5 343
 15   FORMAT(42H0PLEASE MOUNT CORRECT TAPE AND PRESS START)                LNK5 344
 16   FORMAT(/18X,35HIDENTIFICATION FROM TOPOGRAPHY TAPE18X12A6)           LNK5 345
 17   FORMAT(25X,E13.5,5X,E13.5,6X,E13.5)                                  LNK5 346
 18   FORMAT(58H0TRANSPORT IS COMPLETED. INTERMEDIATE RESULTS ARE ON TAPLNK5 347
     1E I2)                                                                LNK5 348
 19   FORMAT(44H0PLEASE FILE PROTECT THE REEL ON TAPE DRIVE I2,25H  AT TLNK5 349
     1HE END OF THIS RUN.)                                                 LNK5 350
 20   FORMAT(6F10.5)                                                       LNK5 351
 21   FORMAT(18I4)                                                         LNK5 352
 22   FORMAT(A6,I3,4E12.5,I5)                                              LNK5 353
 23   FORMAT(1H1///51X19H* * * * * * * * * *//12X101HT H E   D E P A R TLNK5 354
     1 M E N T   O F   D E F E N S E   F A L L O U T   P R E D I C T I OLNK5 355
     2 N   S Y S T E M,//51X,19H* * * * * * * * * *////52X,16HTRANSPORT LNK5 356
     3MODULE///55X,11HPREPARED BY/43X,34HTECHNICAL OPERATIONS RESEARCH,ILNK5 357
     4NC./52X,17HBURLINGTON, MASS.////29X,63H****  SUMMARY OF INPUT IDENLNK5 358
     5TIFIERS AND INITIAL CONDITIONS  ****)                                LNK5 359
 24   FORMAT(//15X16HTOPOGRAPHIC DATA)                                     LNK5 360
 27   FORMAT(//15X13HPARTICLE DATA/18X28HDENSITY OF FALLOUT PARTICLESF20LNK5 361
     1.3,2X/7HKG/M**3)                                                     LNK5 362
 28   FORMAT(//15X9HWIND DATA/)                                            LNK5 363
 29   FORMAT(18X,A6,1X,I6,4(1X,E13.5),1X,I10)                              LNK5 364
 30   FORMAT(18X,A6,4(1X,F13.5),I6)                                        LNK5 365
 31   FORMAT(6F12.3)                                                       LNK5 366
C                                                                          LNK5 367
C ************************************************************************LNK5 368
C                                                                          LNK5 369
      DATA HTST,DTST,BLANK,POUT,ENDWFD/6HIHTOPO,6HIFARIN,6H      ,6HIPOULNK5 370
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```
     1T ,6HEND OF/                                                      LNK5 371
C                                                                       LNK5 372
C ***********************************************************************LNK5 373
C ***********************************************************************LNK5 374
C                                                                       LNK5 375
C      THIS BYPASSES INITIALIZATION CODING AFTER THE FIRST PASS          LNK5 376
       NUL=0                                                            LNK5 381
       IF (IBYPAS-918273)201,200,201                                    LNK5 377
 201   IBYPAS=918273                                                    LNK5 378
C      INITIALIZE                                                       LNK5 379
       JDONE=0                                                          LNK5 380
       IPARIN=11                                                        LNK5 382
       IOTOPO=4                                                         LNK5 383
       IOWIND=3                                                         LNK5 384
       IHTOPO=10                                                        LNK5 385
       IPOUT= 9                                                         LNK5 386
       IPAROT=1                                                         LNK5 387
       JTOP1=0                                                          LNK5 388
       JWIND1=0                                                         LNK5 389
       JTIME1=0                                                         LNK5 390
       ENDTIM=0.0                                                       LNK5 391
       JETOPO=1                                                         LNK5 392
       MATOPO=4                                                         LNK5 393
       DTMAC=10.                                                        LNK5 394
       DTLOC=10.                                                        LNK5 395
       NALOFT=200                                                       LNK5 396
       NBMAX=150                                                        LNK5 397
       NFREE=NALOFT                                                     LNK5 398
       NLOST=0                                                          LNK5 399
       NSTRAT =70                                                       LNK5 400
       NH=0                                                             LNK5 401
       NTO=0                                                            LNK5 402
       NG=0                                                             LNK5 403
C                                                                       LNK5 404
C      ILIM,JLIM,KLIM,ARE LIMITS ON TOPO ARRAYS. SEE DIMENSION.         LNK5 405
       ILIM=10                                                          LNK5 406
       JLIM=10                                                          LNK5 407
       KLIM=400                                                         LNK5 408
       DO 2011 J=1,NALOFT                                               LNK5 409
 2011  FMAS(J)=0.0                                                      LNK5 410
C                                                                       LNK5 411
C      READ IDENTIFICATION FOR TRANSPORT                                LNK5 412
       READ (ISIN,1)(TID(J),J=1,12)                                     LNK5 413
C                                                                       LNK5 414
C      READ CONTROL DATA FOR TRANSPORT                                  LNK5 415
C      THESE CONTROL PARAMETERS ARE FOR USE AS SIMPLIFYING SWITCHES     LNK5 416
       READ (ISIN,21)(IC(J),J=1,18)                                     LNK5 417
       READ (ISIN,31)TLIMIT                                             LNK5 418
C                                                                       LNK5 419
C      REWIND ALL TAPES INVOLVED IN TRANSPORT                           LNK5 420
       IF(IC(1)-1)150,151,151                                           LNK5 421
 150   REWIND IHTOPO                                                    LNK5 422
 151   IF(IC(2)-1)152,153,153                                           LNK5 423
 152   REWIND IOTOPO                                                    LNK5 424
 153   IF(IC(3)-1)154,155,155                                           LNK5 425
 154   REWIND IOWIND                                                    LNK5 426
 155   IF(IC(4)-1)156,157,157                                           LNK5 427
 156   REWIND IPAROT                                                    LNK5 428
 157   CONTINUE                                                         LNK5 429
       REWIND IPARIN                                                    LNK5 430
```

```
      REWIND IPOUT
C
C     CHECK IDENTIFICATIONS ON TOPO AND PARTICLE INPUT TAPES
 206  IF(IC(1)-1)158,203,203
 158  READ (IHTOPO)DENTI
      RTST=AND(DENTI,COMPL(HTST))
      IF(RTST)202,2031,202
C
C 202  WRONG TAPE AS IHTOPO
 202  PRINT 14,IHTOPO
      WRITE (ISOUT,14)IHTOPO
      PRINT 15
      REWIND IHTOPO
      PAUSE
      REWIND IHTOPO
      GO TO 206
C
C 204  WRONG TAPE AS IPARIN
 204  PRINT 14,IPARIN
      WRITE (ISOUT,14)IPARIN
      PRINT 15
      REWIND IPARIN
      PAUSE
      REWIND IPARIN
      GO TO 207
 2031 READ(IHTOPO)TXLL,TXLU,TYLL,TYLU,NBLCK
C
 203  CONTINUE
 207  READ (IPARIN)DENTT
      RTST=AND(DENTT,COMPL(DTST))
      IF(RTST)204,208,204
C
C 208 READ ARBITRARY 72 CHARACTER FIREBALL,CLOUD-RISE,AND PARTICLE
C     ACTIVITY IDENTIFICATIONS FROM IPARIN
  208 READ (IPARIN) FW,SSAM,SLDTMP,TMSD,SIGMA,TW,HOB,NSP,XGZ,YGZ,TGZ,DZ,
     1 NCL,RADMAX
      READ (IPARIN)(PSEID(J),J=1,12)
      READ (IPARIN)(CRID(J),J=1,12)
      READ (IPARIN)(DETID(J),J=1,12)
C
C     READ DENSITY OF FALLOUT PARTICLES
C     ROPART IS PARTICLE DENSITY IN KILOGRAMS PER CUBIC METER
      READ (IPARIN)ROPART
C
C     READ PARTICLE SIZE MASS AND ACTIVITY DISTRIBUTIONS
      READ (IPARIN)NPS
C
C     VX(  ) IS USED TO TEMPORARILY STORE THE SURFACE TO VOLUME RATIO
C     ARRAY SV
C     VY(  ) IS USED TO TEMPORARILY STORE THE A ARRAY FROM PSE (LINK4)
C     VZ(  ) IS USED TO TEMPORARILY STORE THE FACT ARRAY FROM PSE(LINK4)
      READ (IPARIN)(PS(I),VY(I),VZ(I),VX(I),I=1,NPS)
C
C     READ ATMOSPHERIC DENSITY AND VISCOSITY
C     A TABLE OF ATMOSPHERIC VISCOSITY (ATEMP(J)) AND DENSITY (RHO(J))
C     STATED IN THE MKS SYSTEM FOR 200 METER STRATA STARTING FROM 1100
C     METERS BELOW MSL
      READ (IPARIN)NA
      READ (IPARIN)(ATEMP(J),RHO(J),J=1,NA)
C
```

```
C     COMPUTE CONSTANT FOR FALL RATE CALCULATIONS
      FROG=1.3066667E-17*ROPART
C
C     READ ARBITRARY TOPO IDENTIFICATION
      IF(IC(1)-1)159,160,160
 160  READ (ISIN,20)TTOPO
      GO TO 205
 159  READ (IHTOPO)(TOPID(J),J=1,12)
C
C     READ TOPO TABLE OF CONTENTS
      READ (IHTOPO)TOPOLM
      READ (IHTOPO)ITOPLM
C
C     FIND HIGHEST TOPO HEIGHT
      HTOPO=0.0
      DO 170 J=1,NBLCK
      IF(HTOPO-TOPOLM(4,J))171,170,170
 171  HTOPO=TOPOLM(4,J)
 170  CONTINUE
C
C     READ FIRST TOPO DATA BLOCK
      CALL RDTOPO (1)
C
C 205  PUT AN IDENTIFICATION ON THE TRANSPORT INTERMEDIATE OUTPUT TAPE
 205  READ (ISIN,1)(WID(J),J=1,12)
      WRITE (IPOUT)POUT
      WRITE(IPOUT ) FW,SSAM,SLDTMP,TMSD,SIGMA,TN,HOB,NCL,TLIMIT,BZ,
     1 ROPART,XGZ,YGZ,TGZ,RADMAX
      WRITE (IPOUT) (DETID(J),J=1,12),(CRID(J),J=1,12),(PSEID(J),J=1,12)
     1,(TID(J),J=1,12),(WID(J),J=1,12)
      WRITE (IPOUT)NPS
      WRITE (IPOUT)(PS(J),VY(J),VZ(J),VX(J),J=1,NPS)
      IF(IC(1)-1)2054,2055,2054
 2055 CONTINUE
      WRITE (IPOUT) (BLANK,J=1,12)
      GO TO 2056
 2054 WRITE (IPOUT)(TOPID(J),J=1,12)
C
C     PRINT TRANSPORT OUTPUT HEADING
 2056 WRITE (ISOUT,23)
      WRITE (ISOUT,2) (DETID(J),J=1,12),(CRID(J),J=1,12),(PSEID(J),J=1,1
     12),(TID(J),J=1,12)
      WRITE (ISOUT,7)
      WRITE (ISOUT,8)(IC(J),J=1,18)
      WRITE (ISOUT,9)TLIMIT
      WRITE (ISOUT,27)ROPART
      WRITE (ISOUT,29)DENTT,NSP,XGZ,YGZ,TGZ,BZ,NCL
      WRITE (ISOUT,24)
      IF(IC(1)-1)2051,2052,2051
 2052 WRITE (ISOUT,10)TTOPO
      GO TO 2053
 2051 WRITE (ISOUT,16)(TOPID(J),J=1,12)
      WRITE (ISOUT,30)DENTI,TXLL,TXLU,TYLL,TYLU,NBLCK
 2053 WRITE (ISOUT,28)
      WRITE (ISOUT,3)(WID(J),J=1,12)
      WRITE(ISOUT,6)
      HS=-1100.0
      DO 2057 J=1,NA
      WRITE(ISOUT,17)HS,ATEMP(J),RHO(J)
 2057 HS=HS+200.0
```

```
C                                                                       LNK5 551
C ***********************************************************************LNK5 552
C                                                                       LNK5 553
C 200 ANY MORE TIME INTERVALS TO BE DEALT WITH.     NO TO 500             LNK5 554
  200 IF(TLIMIT-ENDTIM)500,500,400                                      LNK5 555
C                                                                       LNK5 556
C 500 MAKE FINAL TRANSPORT PROGRAM OUTPUT AND COMMENTS                  LNK5 557
C     SET N=NALOFT TO CAUSE  DUMPP  TO CLEAR OUT THE ENTIRE PARTICLE ARRLNK5 558
C                                                                       LNK5 559
 500  N=NALOFT                                                          LNK5 560
      CALL DUMPP                                                        LNK5 561
C                                                                       LNK5 562
C     ARE ANY PARTICLES ON THE TIME BOUNDARY TAPE.   YES TO 700          LNK5 563
C********************   TEMP    ************************************   LNK5 564
      JTIME1=0                                                          LNK5 565
      IF(JTIME1)501,501,700                                             LNK5 566
C                                                                       LNK5 567
C 700  PRINT ANY PARTICLE DESCRIPTIONS THAT REMAIN ON THE TIME BOUNDARY LNK5 568
C     OVERFLOW TAPE, IPAROT                                             LNK5 569
 700  WRITE(IPAROT)NUL                                                  LNK5 570
      REWIND IPAROT                                                     LNK5 571
      WRITE (ISOUT,11)                                                  LNK5 572
 702  READ (IPAROT)N                                                    LNK5 573
      IF(N)501,501,701                                                  LNK5 574
 701  READ (IPAROT)(XP(J),YP(J),ZP(J),TP(J),PS(J),FMAS(J),J=1,N)        LNK5 575
      WRITE (ISOUT,12)(XP(J),YP(J),ZP(J),TP(J),PS(J),FMAS(J),J=1,N)     LNK5 576
      GO TO 702                                                         LNK5 577
C                                                                       LNK5 578
C 501  WRITE A FINAL ZERO BLOCK COUNT AND EOF ON IPOUT                  LNK5 579
 501  WRITE (IPOUT)NUL                                                  LNK5 580
      REWIND IPOUT                                                      LNK5 582
      WRITE (ISOUT,18)IPOUT                                             LNK5 583
      PRINT 18,IPOUT                                                    LNK5 584
      PRINT 19,IPOUT                                                    LNK5 585
C                                                                       LNK5 586
C 5010  SKIP OVER ANY UNUSED WIND DATA                                  LNK5 587
C     A CARD CONTAINING *END OF WIND FIELD DATA* MUST MARK THE END OF   LNK5 588
C     THE WIND FIELD DATA DECK                                          LNK5 589
 5010 READ(ISIN,1)RTST                                                  LNK5 590
      RTST=AND(ENDWFD,COMPL(RTST))                                      LNK5 591
      IF(RTST)5010,800,5010                                             LNK5 592
C                                                                       LNK5 593
C 800 PREPARE TO CALL OUTPUT PROCESSOR PROGRAM                          LNK5 594
 800  IEXEC=2                                                           LNK5 595
      RETURN                                                            LNK5 596
C                                                                       LNK5 597
C 400 GET OR OTHERWISE PRODUCE THE NEXT TIME INTERVAL*S WIND FIELD.     LNK5 598
 400  NTI=0                                                             LNK5 599
      IEXEC = 1                                                         LNK5 600
      RETURN                                                            LNK5 601
      END                                                               LNK5 602
      RETURN                                                            LNK5 601
$IBFTC LNK6    LIST,DECK,M94/2                                          LNK6   0
      SUBROUTINE LINK6                                                  LNK6   1
      CALL MKWIND                                                       LNK6   2
      RETURN                                                            LNK6   3
      END                                                               LNK6   4
$IBFTC MKWIN2  LIST,DECK,M94/2                                          MKWI   0
      SUBROUTINE MKWIND                                                 MKWI   1
C     25 NOVEMBER 1966                                                  MKWI   2
```

```
C     T. W. SCHWENKE   TECHNICAL OPERATIONS RESEARCH    SR  MKWIND  MK2 MKWI
C                                                                       MKWI
C *********************************************************************MKWI
C                                                                       MKWI
C     THIS SUBROUTINE FORMS A HORIZONTALLY AND VERTICALLY VARIANT WIND  MKWI
C     DESCRIPTION IN CORE ON THE BASIS OF INPUTS FROM THE SYSTEM INPUT  MKWI
C     TAPE.  INPUTS ARE AS FOLLOWS..                                    MKWI
C       1  CONTROL VARIABLES ENDTIM ,   WHICH GIVES THE TIME AT WHICH   MKWI
C        THE FOLLOWING DATA CEASE TO BE VALID , ALPHA ,     WHICH IS A  MKWI
C        WEIGHTING FACTOR TO BE APPLIED TO VERTICAL DISTANCES, BETA,    MKWI
C        WHICH IS A WEIGHTING FACTOR TO BE APPLIED TO HORIZONTAL        MKWI
C        DISTANCES, AND NN ,   WHICH SPECIFIES THE NUMBER OF NEAREST    MKWI
C        VECTORS TO BE USED IN ESTIMATING THE WIND VECTOR AT A GRID     MKWI
C        POINT.                                                         MKWI
C       2  WIND GRID SPECIFICATIONS IN THE FORM BOTHIT(J),WGRINT(J),    MKWI
C        WLLX(J),WLLY(J),WURX(J),WURY(J)       (6F10.3)                 MKWI
C        WHERE BOTHIT(J) IS THE HEIGHT OF THE BOTTOM OF THE J-TH ARRAY, MKWI
C        WGRINT(J) IS THE GRID INTERVAL TO BE USED IN THE J-TH LAYER,   MKWI
C        AND WLLX(J), WLLY(J),WURX(J),WURY(J) ARE LOWER LEFT CORNER AND MKWI
C        UPPER RIGHT CORNER LIMIT COORDINATES.                          MKWI
C       3  WIND VECTOR DATA IN THE FORM (BOTHIT(J),ZS(J),XS(J),YS(J),   MKWI
C         SX(J),SY(J),SZ(J)                                             MKWI
C        (6F12.3) WHERE  ZS(J) IS THE HEIGHT OF THE J-TH VECTOR,        MKWI
C        +SX(J) IS THE EASTWARD POINTING COMPONENT OF THE J-TH VECTOR,  MKWI
C        +SY(J) IS THE NORTHWARD POINTING COMPONENT OF THE J-TH VECTOR, MKWI
C        +SZ(J) IS THE UPWARD COMPONENT OF THE J-TH VECTOR, XS(J) IS THEMKWI
C        EAST-WEST COORDINATE OF THE J-TH VECTOR, AND YS(J) IS THE      MKWI
C        NORTH-SOUTH COORDINATE OF THE J-TH VECTOR.                     MKWI
C        THE  LAYER READING OPERATION IS TERMINATED WHEN BOTHIT(J) =    MKWI
C        999999. OR MORE IS ENCOUNTERED.  THE VECTOR READING OPERATION  MKWI
C        IS TERMINATED WHEN ZS(J)=999999.0 OR MORE IS ENCOUNTERED.      MKWI
C     A WIND FIELD TAPE IS- NOT- WRITTEN BY THIS PROGRAM.               MKWI
C                                                                       MKWI
C************************ GLOSSARY*************************************MKWI
C                                                                       MKWI
C     ALPHA        A WEIGHTING FACTOR FOR THE VERTICAL DISTANCES        MKWI
C     BETA         A WEIGHTING FACTOR FOR THE HORIZONTAL DISTANCES      MKWI
C     BIG          AN ARBITRARILY LARGE NUMBER                          MKWI
C     DM           DISTANCE BETWEEN THE CURRENT GRID POINT AND THE MOST MKWI
C                  REMOTE OF THE NEAREST NN DATA POINTS                 MKWI
C     DY2(J)       SEE DZ2(J).    FOR Y-DIRECTION BUT UNWEIGHTED        MKWI
C     DZ2(J)       SQUARE OF WEIGHTED Z DISTANCE BETWEEN GRID POINT AND MKWI
C                  THE J-TH DATA VECTOR                                 MKWI
C     GIB          AN ARBITRARILY SMALL NUMBER                          MKWI
C     ISIN         SYSTEM INPUT TAPE NUMBER                             MKWI
C     ISOUT        SYSTEM OUTPUT TAPE NUMBER                            MKWI
C     JH           FINAL (HIGHER) X INDEX .    SEE JLL                  MKWI
C     JJH          NUMBER OF X ROWS IN OUTPUT GRID                      MKWI
C     JLL          INITIAL (LOWER) X-INDEX FOR PRINTING PLANE OF THE    MKWI
C                  WIND FIELD ARRAY                                     MKWI
C     JTOPJ        THE NUMBER OF WIND STRATA IN THE DESIRED WIND FIELD  MKWI
C                  DESCRIPTION                                          MKWI
C     JTOPV        THE TOTAL NUMBER OF WIND DATA POINTS BEING USED      MKWI
C     K            USED BY MKWIND AS A STRATUM INDEX  AT PRINTING TIME  MKWI
C     KK           Y-DIRECTION INDEX AT PRINTING TIME                   MKWI
C     NAD(J)       INDICES OF DISTANCES BETWEEN THE CURRENT GRID POINT  MKWI
C                  AND THE JTH DATA POINT                               MKWI
C     NADT         INDEX OF THE NAD THAT CONTAINS THE ADDRESS OF THE D2 MKWI
C                  WHICH IS THE LARGEST OF NEAREST NN DATA POINTS       MKWI
C     NCODE        IDENTIFICATION NUMBER FOR THE METHOD OF COMPUTATION TO MKWI
```

```
C                BE USED IN TRANSLATING THE WIND DATA INTO THE WIND
C                ARRAYS
C       NN       THE NUMBER OF NEAREST DATA VECTORS THAT THE USER WISHES
C                TO BE USED IN COMPUTATIONS
C       SS       TEMPORARY STORAGE
C       WG2      HALF OF GRID INTERVAL WGRINT(JW)
C       XG       X COORDINATE OF GRID POINT
C       XLIM     AN X-DIRECTION LIMIT FOR TESTING FOR THE COMPLETION OF
C                A ROW IN THE WIND FIELD ARRAY
C       YG       Y COORDINATE OF GRID POINT
C       YLIM     SEE XLIM.   FOR THE Y-DIRECTION
C       ZG       Z COORDINATE OF GRID POINT
C
C*****************************************************************
C
      COMMON /SET1/
     1          DIAM    , DETID  , IRISE  , IEXEC  , ISIN   , ISOUT   ,
     2          SD      , SPAR   , SSAM   , THE    , TMP1   , TMP2    ,
     3          T2M     , U      , VPR    , W      , X      , Z       ,
     4          WHY     , RMIN   , IDISTR , SPAR1  , SPAR2  , SPAR3   ,
     5          SPAR4   , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9
      DIMENSION  DETID(12),WHY(40)
      COMMON /SET2/
     1          S       , SUBSID , GRINT  , BXLL   , BXLU   , BYLL
     2,         BYLU    , TXLL   , TXLU   , TYLL   , TYLU   , XGZ
     3,         YGZ     , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM
     4,         KLIM    , II     , JJ     , KK     , XP     , YP
     5,         ZP      , FMAS   , TP     , PS     , VX     , VY
     6,         VZ      , IL     , JL     , IBADD  , WGRINT , NSTRAT
     7,         WLLX    , WLLY   , WURX   , WURY   , BOTHIT , IPARIN
     8,         IOTOPO  , IOWIND , IHTOPO , IPOUT  , IPAROT , JTOP1
     9,         JWIND1  , IRROR  , TLIMIT , ENDTIM , IC     , IBYPAS
     1,         JTOPJ   , NLOST  , NG     , NTO    , NTI    , NW
     2,         HALOFT  , JTIME1 , NBMAX  , NFREE  , N      , NCL
     3,         CRMAXY  , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY
     4,         UO      , SN     , CS     , NLOCIR , DTLOC  , ATEMP
     5,         RHO     , NA     , TGZ    , DTMAC  , FROG   , CRMAXX
     6,         NOPART
      DIMENSION TOPOLM(4,4)    ,NONTAR(4)      ,ITOPLM(3,4)
      DIMENSION S(10,10)       ,SUBSID(400)    ,IC(18)
      DIMENSION XP(200)        ,YP(200)        ,ZP(200)       ,FMAS(200)
      DIMENSION TP(200)        ,PS(200)        ,ATEMP(260)    ,RHO(260)
      DIMENSION VX(1500)       ,VY(1500)       ,VZ(1500)      ,IL(70)
      DIMENSION JL(70)         ,IBADD(70)      ,WURX(70)
      DIMENSION WGRINT(70)                     ,WLLX(70)      ,WLLY(70)
      DIMENSION WURY(70)       ,BOTHIT(70)     ,SN(6)         ,CS(6)
      DIMENSION CRMINX(6)      ,CRMAXX(6)      ,CRMINY(6)     ,CRMAXY(6)
      DIMENSION CRUHT(6)       ,NCRTYP(6)      ,UO(6)
C     PARAMETERS PECULIAR TO MKWIND MK2
      DIMENSION XS(300),YS(300)9SX(300),SY(300),SZ(300),ZS(300),
     1DZ2(300),DY2(300),D2(300)9NAD(300)
C
C *****************************************************************
C
    1 FORMAT(6F10.3)
    2 FORMAT(//70H0THE FOLLOWING WIND VECTORS HAVE BEEN USED TO DEFINE A
     1N ATMOSPHERE UP TO TIME F8.0)
    3 FORMAT(/7X6HVECTOR7X22HHORIZONTAL COORDINATES8X17HVECTOR COMPONENT
     1S/72X...)
    4 FORMAT(4X,6F20.3)
```

```
5     FORMAT(/62H  INADEQUATE CONTROL DATA.  COMPUTATION METHOD 1 WILL B
     1E USED.)
6     FORMAT(64H ENCOUNTERED TWO WIND GRID LAYER REQUESTS FOR THE SAME A
     1LTITUDE.)
8     FORMAT(5I4)
9     FORMAT(19H0COMPUTATION METHOD,I4,17H IS NOT AVAILABLE)
10    FORMAT(/10X26HREQUESTED GRID ARRANGEMENT/7X6HHEIGHT9X8HINTERVAL22X
     16HLIMITS/33X4HWLLX8X4HWLLY8X4HWURX8X4HWURY/(4X6F12.3))
11    FORMAT(16H1WIND COMPONENTS)
12    FORMAT(1X,13HEAST-WEST ROW,I6)
13    FORMAT(1X,10F12.5)
14    FORMAT(19H0COMPUTATION METHODI6,17H WAS USED ON THE I6,21H NEAREST
     1 DATA POINTS.)
15    FORMAT(//6H LEVELI3,6X,8HBASE AT ,F12.3,7H METERS)
16    FORMAT(/19H NN WAS REDUCED TO I5)
17    FORMAT(6F12.3)
22    FORMAT(6E20.8)
23    FORMAT(  / 119H AN EXCESSIVE NUMBER OF SIGNIFICANT FIGURES ARE LOS
     1T IN THE LEAST SQUARES CALCULATION.  THE DATA POINTS APPROACH A LI
     2NE/63H OR A PLANE.  THE WEIGHTED VECTOR METHOD IS USED FOR GRID PO
     3INT, 5X, 9H(X,Y,Z)=(, F12.3,1H,,F12.3,1H,,F12.3,1H))
24    FORMAT(// 78H NO VECTORS LIE WITHIN THE SPECIFIED WEIGHTING REGION
     1.  A RANDOM SELECTION OF ,I4, 30H VECTORS ARE EQUALLY WEIGHTED ,
     2/ 5X, 15H FOR GRID POINT,
     3     5X, 9H(X,Y,Z)=(, F12.3,1H,,F12.3,1H,,F12.3,1H))
25    FORMAT ( // 10X,8HALPHA = F14.3, 7HMETERS,15X 7HBETA = F14.3,
     1  7HMETERS.  )
C
C ***********************************************************************
C
      DATA PROGRM,BIG,NWIND,NWTST,GIB /6HMKWIND,1.0E+30,1500,0,1.0E-30/
C
C ***********************************************************************
C ***********************************************************************
C
      READ (ISIN,1)ENDTIM,ALPHA,BETA
      ALPHA2=ALPHA*ALPHA
      BETA2=BETA*BETA
C     READ SPECIFICATION OF DESIRED WIND ARRAY PROPERTIES
      READ (ISIN,8)NN,NCODE
      IF(NN)204,204,2041
 204  IRROR=204
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)
 2041 DO 104 J=1,NSTRAT
      READ (ISIN,1) BOTHIT(J), WGRINT(J),WLLX(J),WLLY(J),WURX(J),WURY(J)
      IF(BOTHIT(J)-999999.0)104,105,105
 104  CONTINUE
      IRROR=104
      CALL ERROR(PROGRM,IRROR,ISOUT)
 1041 READ(ISIN,1)XST
      IF(XST-999999.0)1041,105,105
 105  JTOPJ=J-1
C
C     NOW SORT
 1054 KS=0
      DO 1051 J=2,JTOPJ
      IF(BOTHIT(J)-BOTHIT(J-1))1153,1052,1051
 1153 KS=1
      HTST=BOTHIT(J-1)
      VXT=WGRINT(J-1)
```

```
      VYT=WLLX(J-1)
      VZT=WLLY(J-1)
      XST=WURX(J-1)
      YST=WURY(J-1)
      BOTHIT(J-1)=BOTHIT(J)
      WGRINT(J-1)=WGRINT(J)
      WLLX(J-1)=WLLX(J)
      WLLY(J-1)=WLLY(J)
      WURX(J-1)=WURX(J)
      WURY(J-1)=WURY(J)
      BOTHIT(J)=HTST
      WGRINT(J)=VXT
      WLLX(J)=VYT
      WLLY(J)=VZT
      WURX(J)=XST
      WURY(J)=YST
 1051 CONTINUE
      IF(KS)1054,1055,1054
 1052 WRITE (ISOUT,6)
      IRROR=1052
      GO TO 7734
C
C 1055   SORT OF THE REQUESTED LAYERS IS COMPLETE
C     NOW MAKE SURE THAT THERE IS SUFFICIENT SPACE FOR THE WIND FIELD
 1055 DO 1056 J=1,JTOPJ
      K1=(WURX(J)-WLLX(J))/WGRINT(J)+1.0
      K2=(WURY(J)-WLLY(J))/WGRINT(J)+1.0
 1056 NHTST=NHTST+K1*K2
C
C     IS AVAILABLE WIND MEMORY EXCEEDED
      IF(NWIND .GT. NHTST) GO TO 1057
 1058 IRROR=-1058
      GO TO 7734
 1057 DO 100 J=1,300
      READ (ISIN,17)ZS(J),XS(J),YS(J),SX(J),SY(J),SZ(J)
      IF(ZS(J)-999999.0)100,101,101
 101  JTOPV=J-1
      IF(NN-JTOPV)106,106,2051
 2051 NN=JTOPV
      WRITE (ISOUT,16)JTOPV
      GO TO 106
 100  CONTINUE
      IRROR=100
      GO TO 7734
C
C                   VECTOR DATA ARE IN WIND ARRAYS ON INDICES J=1,JTOPV
C     FIRST USE NCODE AS A METHOD CONTROL VARIABLE.  BRANCH ON NCODE VIA
C     A COMPUTED GO TO TO THE DESIRED COMPUTATION METHOD CODE.
 106  NN1=NN+1
      IF(NCODE)110,110,112
 112  IF(NCODE-6)113,113,110
C
C 110  NCODE IS INCORRECT
 110  WRITE (ISOUT,5)
      NCODE=1
 113  GO TO (115,116,117,118,119,120),NCODE
C
C 115 METHOD 1 USES THE NN NEAREST DATA POINTS.  METHODS 2,3 AND 4 ALSO
C     USE THIS CODE BUT FOR METHOD 2, NN=1 AND FOR METHOD 3, NN=JTOPV.
C     FOR METHOD 4, THE NN SPECIFIED BY THE USER IS USED IN THE
```

```
C     LEAST SQUARES METHOD(NN MUST BE GREATER THAN THREE).
 115  IBADD(1)=1
      K=0
      JW=1
C
C     NOW FILL IN THE WIND GRID SIZE WORDS
 1151 IL(JW)=((WURX(JW)-WLLX(JW)))/WGRINT(JW)  +.9999999
      JL(JW)=((WURY(JW)-WLLY(JW)))/WGRINT(JW) +.9999999
C
C     NOW INITIALIZE FOR FILLING IN THE WIND GRID
      WG2=WGRINT(JW)/2.0
      LX=1
      LY=1
      XG=WLLX(JW)+WG2
      YG=WLLY(JW)+WG2
      IF(JW-JTOPJ)1154,1155,1159
 1159 IRROR=1159
      GO TO 7734
 1155 IF(JW-1)1156,1156,1157
 1156 ZG=BOTHIT(JW)
      GO TO 1158
 1157 ZG=ZG+BOTHIT(JW)-BOTHIT(JW-1)
      GO TO 1158
 1154 ZG=(BOTHIT(JW)+BOTHIT(JW+1))/2.0
C
C     SET ALL NAD(J) EQUAL TO J TO PROVIDE INDICES FOR THE FULL SET OF
C     DATA POINTS AND TO PROVIDE AN INITIAL SET OF -NEAREST- DATA POINTS
C     SET NADT=1 TO BEGIN THE SORT PROCEDURE THAT SELECTS THE MOST
C     REMOTE OF THE SET OF -NEAREST- DATA POINTS.  NOTE THAT FOR THE 1ST
C     PASS ALL THE NN -NEAREST- POINTS ARE EQUALLY LIKELY TO BE THE MOST
C     REMOTE OF THE SET.
 1158 DO 203 J=1,JTOPV
 203  NAD(J)=J
      NADT=1
C
C     COMPUTE DISTANCES BETWEEN THE CURRENT GRID POINT (XG,YG,ZG) AND
C     EACH OF THE DATA VECTOR LOCATIONS
C
C     COMPUTE SQUARED Z DELTAS
      DO 199 J=1,JTOPV
      T1=(ZS(J)-ZG)
      T1=T1*T1
      T2=(ALPHA2-T1)
      IF(T2.LE.0.0)  T2=0.0
 199  DZ2(J)=T2/(ALPHA2+T1)
C
C     COMPUTE SQUARED Y DELTAS
 200  DO 201 J=1,JTOPV
      T1=YS(J)-YG
 201  DY2(J)=T1*T1
C
C     COMPUTE SQUARED DISTANCES
 2011 DO 202 J=1,JTOPV
      T1=(XS(J)-XG)*(XS(J)-XG)+DY2(J)
      T2=((BETA2-T1)/(BETA2+T1))+DZ2(J)
      IF(T2-GIB) 2021,2021,2022
 2021 D2(J)=BIG
      GO TO 202
 2022 D2(J)=1.0/T2
 202  CONTINUE
```

```
C
C     FIND THE ADDRESS OF AND DISTANCE TO THE MOST REMOTE POINT OF THE
C     NN -NEAREST- POINTS (THE POINTS WHOSE ADDRESSES ARE GIVEN BY
C     NAD(1),NAD(NN).) STORE THAT MAXIMUM DISTANCE IN THE WORD DM AND
C     SET NADT SUCH THAT DM=D2(NAD(NADT)).
      KL=NAD(NADT)
      DM=D2(KL)
      DO 207 J=1,NN
      KL=NAD(J)
      IF(DM-D2(KL))208,207,207
  208 DM=D2(KL)
      NADT=J
  207 CONTINUE
C     AT THIS POINT, DM IS THE LARGEST D2(J) FOR J=NAD(J),NAD(NN)
C
      IF (NN1-JTOPV)2072,2072,2073
C
C2072 NOW SELECT BEST NN POINTS
C     SCAN THE SET D2(J),J=NAD(NN+1,JTOPV) UNTIL A D2(J) LESS THAN DM
C     IS FOUND.  IF ONE IS FOUND, SWITCH NAD(NADT) WITH THE SELECTED NAD
C     THEN RESET DM AND NADT TO INDICATE THE MOST REMOTE OF THE NEAREST
C     NN POINTS.  WHEN THE FULL SET D2(J),J=NAD(NN+1,JTOPV) HAS BEEN
C     SCANNED, THE SET OF NEAREST DATA POINTS HAS BEEN SELECTED.  ONLY
C     ONE SCAN IS REQUIRED.
 2072 DO 210 J=NN1,JTOPV
      KL=NAD(J)
      IF(DM-D2(KL))210,210,211
  211 NTEMP=NAD(J)
      NAD(J)=NAD(NADT)
      NAD(NADT)=NTEMP
C
C     NOW RESET DM AND NADT TO THE NEW MOST REMOTE POINT
      DM=D2(KL)
      DO 212 KKK=1,NN
      KL=NAD(KKK)
      IF(DM-D2(KL))213,212,212
  213 DM=D2(KL)
      NADT=KKK
C
C     DM AND NADT ARE SET WITH THE PARAMETERS OF THE MOST REMOTE OF
C     THE NEAREST NN POINTS
  212 CONTINUE
  210 CONTINUE
 2073 CONTINUE
C
C     THE NEAREST NN HAVE BEEN FOUND
C     *********SOME DAY INSERT HERE A BRANCH IAW WEIGHTING METHOD HERE**
C
C     INCREMENT INDEX FOR STORING VECTOR COMPUTED FOR POINT (XG,YG,ZG)
      K=K+1
C
C     IS THE LEAST SQUARES METHOD TO BE USED.  YES TO 2081
      IF(NCODE-4)2080,2081,2080
C
C2081 THIS IS THE LEAST SQUARES METHOD
C     INITIALIZE FOR LEAST SQUARES METHOD
 2081 SNN=NN
      SDX=0.0
      SDY=0.0
      SDZ=0.0
```

```
      SDX2=0.0
      SDY2=0.0
      SDZ2=0.0
      SDXY=0.0
      SDXZ=0.0
      SDYZ=0.0
      SAU=0.0
      SAV=0.0
      SAW=0.0
      SUX=0.0
      SUY=0.0
      SUZ=0.0
      SVX=0.0
      SVY=0.0
      SVZ=0.0
      SWX=0.0
      SWY=0.0
      SWZ=0.0
C
C     BEGIN LOOP TO EVALUATE INTERMEDIATE STEP FOR LEAST SQUARES CALC.
      DO 3100 J=1,NN
      KL=NAD(J)
C
C      COMPUTE DISTANCE BETWEEN KL-TH DATA POINT AND CURRENT GRID POINT
      T1=XS(KL)-XG
      TY=YS(KL)-YG
      TZ=ZS(KL)-ZG
C
C     COMPUTE ELEMENTS OF LEAST SQUARES MATRIX, B
      SDX=SDX+T1
      SDY=SDY+TY
      SDZ=SDZ+TZ
      SDX2=SDX2+T1*T1
      SDY2=SDY2+DY2(KL)
      SDZ2=SDZ2+DZ2(KL)
      SDXY=SDXY+T1*TY
      SDXZ=SDXZ+T1*TZ
      SDYZ=SDYZ+TY*TZ
      SAU=SAU+SX(KL)
      SAV=SAV+SY(KL)
      SAW=SAW+SZ(KL)
      SUX=SUX+T1*SX(KL)
      SUY=SUY+TY*SX(KL)
      SUZ=SUZ+TZ*SX(KL)
      SVX=SVX+T1*SY(KL)
      SVY=SVY+TY*SY(KL)
      SVZ=SVZ+TZ*SY(KL)
      SWX=SWX+T1*SZ(KL)
      SWY=SWY+TY*SZ(KL)
 3100 SWZ=SWZ+TZ*SZ(KL)
      SAUG1=SDY2*SDZ2-SDYZ*SDYZ
      SAUG2=SDXY*SDZ2-SDYZ*SDXZ
      SAUG3=SDXY*SDYZ-SDY2*SDXZ
      SAUG4=SDX2*SDYZ-SDXY*SDXZ
C
C     COMPUTE COMPLEMENTARY MINORS OF MATRIX B
      B11=SDX2*SAUG1-SDXY*SAUG2+SDXZ*SAUG3
      B21=SDX*SAUG1-SDY*SAUG2+SDZ*SAUG3
      B31=SDX*SAUG2-SDY*(SDX2*SDZ2-SDXZ*SDXZ)+SDZ*SAUG4
      B41=SDX*SAUG3-SDY*SAUG4+SDZ*(SDX2*SDY2-SDXY*SDXY)
```

```
C                                                                       
C         TEST TO SEE IF A ROW OR COLUMN IS APPROXIMATELY ZERO
      BB= AMAX1(ABS(SNN*B11),ABS(SDX*B21),ABS(SDY*B31), ABS(SDZ*B41))
      IF(BB-1.0E-20)3800,3800,3700
C
C     COMPUTE DETERMINANT OF B
 3700 BBB=SNN*B11-SDX*B21+SDY*B31-SDZ*B41
C
C     TEST FOR LOSS OF PRECISION
      IF(ABS(BBB/BB)-0.001)3800,3800,3900
C
C3800 TOO MANY SIGNIFICANT FIGURES ARE LOST IN THE LEAST SQUARES
C     CALCULATION.  THE DATA POINTS APPROACH A POINT, A LINE, OR A
C     PLANE.  USE THE WEIGHTED VECTOR METHOD
 3800 WRITE (ISOUT,23)XG,YG,ZG
      GO TO 2080
C
C     COMPUTE WIND VECTORS
 3900 VX(K)=(B11*SAU-B21*SUX+B31*SUY-B41*SUZ)/BBB
      VY(K)=(B11*SAV-B21*SVX+B31*SVY-B41*SVZ)/BBB
      VZ(K)=(B11*SAW-B21*SWX+B31*SWY-B41*SWZ)/BBB
      GO TO 2090
C
C2080 COMPUTE AND SUM  THE WEIGHTING FACTORS
 2080 SUM=0.0
      DO 214 J=1,NN
      L=NAD(J)
 2142 D2(L)=1.0/D2(L)
 214  SUM=SUM+D2(L)
      IF(SUM/FLOAT(NN) .LE. GIB) WRITE(ISOUT,24) NN,XG,YG,ZG
C
C     NOW COMPUTE VECTOR ESTIMATE AT GRID POINT
C     COMPUTE STORAGE INDEX
C     COMPUTE AND STORE WIND ESTIMATE AT GRID POINT
      VX(K)=0.0
      VY(K)=0.0
      VZ(K)=0.0
      DO 216 J=1,NN
      L=NAD(J)
      VX(K)=VX(K)+SX(L)*D2(L)
      VY(K)=VY(K)+SY(L)*D2(L)
 216  VZ(K)=VZ(K)+SZ(L)*D2(L)
      VX(K)=VX(K)/SUM
      VY(K)=VY(K)/SUM
      VZ(K)=VZ(K)/SUM
 2090 XG=XG+WGRINT(JW)
      LX=LX+1
      IF(LX-IL(JW))2011,2011,2012
 2012 XG=WLLX(JW)+WG2
      LY=LY+1
      LX=1
      YG=YG+WGRINT(JW)
      IF(LY-JL(JW))200, 200,1152
 1152 JW=JW+1
      IF(JW-JTOPJ)1160,1160,130
 1160 JT=JW-1
      IBADD(JW)=IBADD(JT)+(IL(JT))*(JL(JT))
      GO TO 1151
C
C 116  METHOD 2   NEAREST VECTOR
```

```
 116  NN=1
      GO TO 115
C
C 117  METHOD 3    ALL VECTORS WEIGHTED
 117  NN=JTOPV
      GO TO 115
 118  CONTINUE
C
C 118  METHOD 4   LEAST SQUARES
C     USE BRANCH ON NCODE=4 TO BRANCH TO LEAST SQUARES IN CODE
C     NN MUST BE GREATER THAN 3 FOR THE LEAST SQUARES METHOD
 1180 IF(NN-4)1181,115,115
 1181 IRROR=1181
      GO TO 7734
 119  CONTINUE
 120  CONTINUE
 121  WRITE (ISOUT,9)NCODE
      IRROR=121
      GO TO 7734
 130  WRITE (ISOUT,2)ENDTIM
      WRITE (ISOUT,3)
      WRITE (ISOUT,4)(ZS(J),XS(J),YS(J),SX(J),SY(J),SZ(J),J=1,JTOPV)
      WRITE (ISOUT,10)(BOTHIT(J),WGRINT(J),WLLX(J), WLLY(J),WURX(J),WURY
     1(J),J=1,JTOPJ)
      WRITE (ISOUT,14)NCODE,NN
      WRITE (ISOUT,25)  ALPHA, BETA
      IF(IC(7)-1)109,1091,109
 1091 WRITE (ISOUT,11)
      DO 107 K=1,JTOPJ
      WRITE (ISOUT,15)K,BOTHIT(K)
      JJH=JL(K)
      JLL=IBADD(K)
      DO 108 KK=1,JJH
      JH=JLL+IL(K)-1
      WRITE (ISOUT,12)KK
      WRITE (ISOUT,13)(VX(J),J=JLL,JH)
      WRITE (ISOUT,13)(VY(J),J=JLL,JH)
      WRITE (ISOUT,13)(VZ(J),J=JLL,JH)
      JLL=JH+1
 108  CONTINUE
 107  CONTINUE
 109  CALL RDCIRS
      RETURN
      END
$IBFTC RDCIR   LIST,DECK,M94/2
      SUBROUTINE RDCIRS
C     12 OCT 66
C     T.W.SCHWENKE       TECHNICAL OPERATIONS RESEARCH, INC.
C
C ********************************************************************
C
C     THIS PROGRAM READS LOCAL CIRCULATION SYSTEM INPUTS.  IT READS
C     SYSTEM COORDINATE LIMITS, CIRMINX( ),CRMAXX( ),CRMINY( ),CRMAXY(
C     THE INDEX OF THE APPLICABLE COMPUTATION CODE FOR EACH LOCAL
C     SYSTEM IS STORED IN NCRTYP( )
C     A COUNT OF THE NUMBER OF LOCAL SYSTEMS IS RECORDED IN NLOCIR
C
C ********************************************************************
C
      COMMON /SET1/
```

```
     1           DIAM    , DETID  , IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2           SD      , SPAR   , SSAM   , TME    , TMP1   , TMP2     ,
     3           T2M     , U      , VPR    , W      , X      , Z        ,
     4           WHY     , RMIN   , IDISTR , SPAR1  , SPAR2  , SPAR3    ,
     5           SPAR4   , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9
      DIMENSION  DETID(12),WHY(40)
C
C ********************************************************************
C
      COMMON /SET2/
     1           S       , SUBSID , GRINT  , BXLL   , BXLU   , BYLL
     2,          BYLU    , TXLL   , TXLU   , TYLL   , TYLU   , XGZ
     3,          YGZ     , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM
     4,          KLIM    , II     , JJ     , KK     , XP     , YP
     5,          ZP      , FMAS   , TP     , PS     , VX     , VY
     6,          VZ      , IL     , JL     , IBADD  , WGRINT , NSTRAT
     7,          WLLX    , WLLY   , WURX   , WURY   , BOTHIT , IPARIN
     8,          IOTOPO  , IOWIND , IHTOPO , IPOUY  , IPAROT , JTOP1
     9,          JWIND1  , IRROR  , TLIMIT , ENDTIM , IC     , IBYPAS
     1,          JTOPJ   , NLOST  , NG     , NTO    , NTI    , NW
     2,          NALOFT  , JTIME1 , NBMAX  , NFREE  , N      , NCL
     3,          CRMAXY  , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY
     4,          UO      , SN     , CS     , NLOCIR , DTLOC  , ATEMP
     5,          RHO     , NA     , TGZ    , DTMAC  , FROG   , CRMAXX
     6,          ROPART
      DIMENSION TOPCLM(4,4)    ,NINTAR(4)       ,ITOPLM(3,4)
      DIMENSION S(10,10)       ,SUBSID(400)     ,IC(18)
      DIMENSION XP(200)        ,YP(200)         ,ZP(200)         ,FMAS(200)
      DIMENSION TP(200)        ,PS(200)         ,ATEMP(260)      ,RHO(260)
      DIMENSION VX(1500)       ,VY(1500)        ,VZ(1500)        ,IL(70)
      DIMENSION JL(70)         ,IBADD(70)       ,WURX(70)
      DIMENSION WGRINT(70)                      ,WLLX(70)        ,WLLY(70)
      DIMENSION WURY(70)       ,BOTHIT(70)      ,SN(6)           ,CS(6)
      DIMENSION CRMINX(6)      ,CRMAXX(6)       ,CRMINY(6)       ,CRMAXY(6)
      DIMENSION CRUHT(6)       ,NCRTYP(6)       ,UO(6)
C
C ********************************************************************
C
    1 FORMAT(4E12.5,I3)
    2 FORMAT(///15X,22HLOCAL CIRCULATION CODE(I4,18H IS NOT AVAILABLE.)
C
C ********************************************************************
C
      DATA PROGRM /6HRDCIRS/
C
C ********************************************************************
C ********************************************************************
C
C     READ DEFINING DATA FOR LOCAL CIRCULATION SYSTEMS
C
      K=0
  120 K=K+1
      READ (ISIN,1) CRMINX(K),CRMAXX(K),CRMINY(K),CRMAXY(K), NCRTYP(K)
      NCIR=NCRTYP(K)
      IF(NCIR)122,100,125
  122 IRROR=122
      GO TO 7734
  125 IF(NCIR-5)120,120,124
  124 IRROR=124
      WRITE (ISOUT,2)NCIR
```

```
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)                                    RDCI  76
C 100 THIS IS THE NORMAL EXIT                                           RDCI  77
C     NLOCIR     THE NUMBER OF LOCAL CIRCULATION SYSTEMS DEFINED FOR USERDCI  78
C                IN TRANSPORTING PARTICLES                              RDCI  79
 100  NLOCIR = K-1                                                      RDCI  80
      RETURN                                                            RDCI  81
      END                                                               RDCI  82
      RETURN                                                            RDCI  81
$IBFTC LIN7    LIST,DECK,M94/2                                          LIN7   0
      SUBROUTINE LINK7                                                  LIN7   1
C          T.W.SCHWENKE  TECHNICAL OPERATIONS RESEARCH         LINK 7   LIN7   2
C     19 OCT 66                                                         LIN7   3
C       THIRD PART OF TRANSPORT MODULE,  PARTICLE TRANSPORT.            LIN7   4
C                                                                       LIN7   5
C ********************************************************************LIN7   6
C                                                                       LIN7   7
C     SEE SUBROUTINE LINK5 FOR A TRANSPORT GLOSSARY                     LIN7   8
C                                                                       LIN7   9
C ********************************************************************LIN7  10
C                                                                       LIN7  11
      COMMON /SET1/                                                     LIN7  12
     1          DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT    , LIN7  13
     2          SD     , SPAR   , SSAM   , TME    , TMP1   , TMP2     , LIN7  14
     3          T2M    , U      , VPR    , W      , X      , Z        , LIN7  15
     4          WHY(40), RMIN   , IDISTR , SPAR1  , SPAR2  , JDONE    , LIN7  16
     5          SPAR4  , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9      LIN7  17
C                                                                       LIN7  18
C ********************************************************************LIN7  19
C                                                                       LIN7  20
      COMMON /SET2/                                                     LIN7  21
     1          S      , SUBSID , GRINT  , BXLL   , BXLU   , BYLL       LIN7  22
     2,         BYLU   , TXLL   , TXLU   , TYLL   , TYLU   , XGZ        LIN7  23
     3,         YGZ    , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM       LIN7  24
     4,         KLIM   , II     , JJ     , KK     , XP     , YP         LIN7  25
     5,         ZP     , FMAS   , TP     , PS     , VX     , VY         LIN7  26
     6,         VZ     , IL     , JL     , IBADD  , WGRINT , NSTRAT     LIN7  27
     7,         WLLX   , WLLY   , WURX   , WURY   , BOTHIT , IPAPIN     LIN7  28
     8,         IOTOPO , IOWIND , IHTOPO , IPOUT  , IPAROT , JTOP1      LIN7  29
     9,         JWIND1 , IRROR  , TLIMIT , ENDTIM , IC     , IBYPAS     LIN7  30
     1,         JTOPJ  , NLOST  , NG     , NTO    , NTI    , NW         LIN7  31
     2,         NALOFT , JTIME1 , NBMAX  , NFREE  , N      , NCL        LIN7  32
     3,         CRMAXY , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY     LIN7  33
     4,         UO     , SN     , CS     , NLOCIR , DTLOC  , ATEMP      LIN7  34
     5,         RHO    , NA     , TGZ    , DTMAC  , FROG   , CRMAXX     LIN7  35
     6,         ROPART                                                  LIN7  36
      DIMENSION TOPOLM(4,4)     ,NINTAR(4)      ,ITOPLM(3,4)            LIN7  37
      DIMENSION S(10,10)        ,SUBSID(400)    ,IC(18)                 LIN7  38
      DIMENSION XP(200)         ,YP(200)        ,ZP(200)      ,FMAS(200) LIN7  39
      DIMENSION TP(200)         ,PS(200)        ,ATEMP(260)   ,RHO(260) LIN7  40
      DIMENSION VX(1500)        ,VY(1500)       ,VZ(1500)     ,IL(70)   LIN7  41
      DIMENSION JL(70)          ,IBADD(70)      ,WURX(70)               LIN7  42
      DIMENSION WGRINT(70)                      ,WLLX(70)     ,WLLY(70) LIN7  43
      DIMENSION WURY(70)        ,BOTHIT(70)     ,SN(6)        ,CS(6)    LIN7  44
      DIMENSION CRMINX(6)       ,CRMAXX(6)      ,CRMINY(6)    ,CRMAXY(6) LIN7  45
      DIMENSION CRUHT(6)        ,NCRTYP(6)      ,UO(6)                  LIN7  46
C                                                                       LIN7  47
C ********************************************************************LIN7  48
C                                                                       LIN7  49
 1    FORMAT(3I5,6E12.5)                                                LIN7  50
 10   FORMAT (I5)                                                       LIN7  51
```

```
 11   FORMAT(6E15.5)
 12   FORMAT(5E15.5,6I5)
C
C ********************************************************************
C
      DATA PROGRM /6HLINK7 /
C
C ********************************************************************
C ********************************************************************
C
      JW=0
      NUL=0
      EPSIL=1.0
C
C     ARE TRANSPORT TRACES TO BE WRITTEN..  YES TO 5500
      IF(IC(6)-1)5510,5510,5500
 5500 MPNT=2
      GO TO 5520
 5510 MPNT =1
C
C     BRANCH TO READ ADDITIONAL DATA
C     READ DATA PECULIAR TO EACH LOCAL WIND SYSTEM
 5520 IF(NLOCIR) 510,510,511
C
C 511 SETTING J NEGATIVE WILL CAUSE THE LOCAL CIRCULATION SYSTEM CODES
C     TO READ THE DATA THAT THEY NEED WHEN THEY ARE FIRST ENTERED
 511  J=-1
      DO 500 I=1,NLOCIR
      K=I
      NCIR=NCRTYP(I)
      GO TO (501,502,503,504,505),NCIR
 501  CALL MTWND1(J,K,AX,AY,AZ)
      GO TO 500
 502  CALL RGWND1(J,K,AX,AY,AZ)
      GO TO 500
 503  CALL CBREZ1(J,K,AX,AY,AZ)
      GO TO 500
C *****************  CODE INSERTION POINTS  ***************************
 504  CONTINUE
 505  CONTINUE
C *****************  CODE INSERTION POINTS  ***************************
 506  IRROR=-506
      GO TO 300
 500  CONTINUE
C
 510  IF(TLIMIT-ENDTIM)48,49,49
 48   ENDTIM=TLIMIT
 49   IF(IC(1)-1)51,50,51
 50   ASSIGN 100 TO IT
      ASSIGN 100 TO ITT
      GO TO 1000
 51   ASSIGN 1071 TO IT
      ASSIGN 1013 TO ITT
 1000 IF=NALOFT
      IF(JTIME1)1113,1112,1112
 1113 JTIME1=0
      GO TO 1001
C
C     ATTEMPT TO READ IN A BLOCK OF PARTICLES ALOFT RECORDS
C     FIRST READ BLOCK SIZE
```

```
 1112 READ (IPARIN)N
C
C      IF BLOCK SIZE IS NEGATIVE OR ZERO, NO BLOCK EXISTS
       IF(N)100,100,101
C
C      CHECK TO SEE IF BLOCK WILL FIT IN ARRAY
 101   IF(N-NALOFT)1021,1021,103
C
C103   ERROR - ALOFT LIST TOO LARGE, SHOULD NEVER HAPPEN. GO TO EXIT.
 103   IRROR=103
C
C300   GENERALIZED ERROR STOP
 300   CALL ERROR(PROGRM,IRROR,ISOUT)
C
 1021 CALL DUMPP
C
C 102 NOW READ A BLOCK OF PARTICLE ALOFT DESCRIPTIONS
 102   IF=N
       READ (IPARIN)(XP(J),YP(J),ZP(J),TP(J),PS(J),FMAS(J),J=1 ,IF)
C
C      ARE TRANSPORT TRACES TO BE WRITTEN..  YES TO 5522
       IF(IC(6))5521,5521,5522
 5522 WRITE (ISOUT,11)(XP(J),YP(J),ZP(J),TP(J),PS(J),FMAS(J),J=1,NALOFT)
 5521 NFREE=NFREE-N
C
C ***********************************************************************
C
C      BEGINNING OF PARTICLES ALOFT LIST LOOP
 1001 DO 160 J=1,IF
       ASSIGN 3052 TO IPAS
       GO TO (5540,5530),MPNT
 5530 WRITE  (ISOUT,11) XP(J),YP(J),ZP(J),TP(J),PS(J),FMAS(J)
C
C      SELECT PARTICLE TO BE TRANSPORTED  --  +TP     +FMAS
 5540 IF(FMAS(J))160,160,192
 192   IF(TP(J))160,193,194
 194   IF(TP(J)-ENDTIM)195,160,1971
 1971 IF(TP(J)-TLIMIT)160,160,197
 193   IRROR=-193
       GO TO 300
 197   IRROR=-197
       GO TO 300
C
C 195  A PARTICLE HAS BEEN SELECTED
C      IS THE CURRENT PARTICLE WITHIN A LOCAL CIRCULATION SYSTEM
 195   IF(NLOCIR)1950,1950,1951
 1951 DO 1952 K=1,NLOCIR
C************************* TEMP     *************************************
       WRITE (ISOUT,1)J,K,NLOCIR,FMAS(J),XP(J),YP(J),ZP(J), TP(J)
       IF(XP(J)-CRMINX(K))1952,1953,1953
 1953 IF(CRMAXX(K)-XP(J))1952,1954,1954
 1954 IF(YP(J)-CRMINY(K))1952,1955,1955
 1955 IF(CRMAXY(K)-YP(J))1952,1956,1956
C
C 1956 THE JTH PARTICLE IS WITHIN THE KTH LOCAL CIRCULATION SYSTEM
C      SUBROUTINE LOTRAN(J,K) TRANSPORTS THE JTH PARTICLE IN THE KTH
C      LOCAL WIND SYSTEM.
 1956 CALL LOTRAN(J,K)
C
C      188 IS WHERE GROUNDED PARTICLES ARE DEALT WITH.
```

```
      IF(ZP(J)+9000.0)188,188,1957
 1957 IF(TP(J)-ENDT(M))1951,1958,1958
 1958 NTI=NTI+1
      GO TO 168
 1952 CONTINUE
C
 1950 XX=XP(J)
      YY=YP(J)
      ZZ=ZP(J)
      PSIZE=PS(J)
 1961 CALL GETWND(XX,YY,ZZ,JWAD,JW)
      IF(JWAD)1959,1960,196
C
C 1959 THE NEEDED WIND FIELD IS NOT IN CORE
 1959 FMAS(J)=-FMAS(J)
      TP(J)=TLIMIT
      NLOST=NLOST+1
      GO TO 160
 1960 IRROR=-1960
      GO TO 300
C
C 196 GET PARTICLE FALL RATE.  PUT IT IN FV WITH SIGN POSITIVE.
 196  CALL FALRAT(ZZ,PSIZE,FV,ATEMP,RHO,FROG,ISOUT)
C
C     COMPUTE VERTICAL PARTICLE MOTION COMPONENT
C     A POSITIVE VPZ DENOTES AN UPWARD POINTING VECTOR
      VPZ=VZ(JWAD)-FV
C
C     COMPUTE TIMES TO NEXT MACRO WIND FIELD BORDERS
C     COMPUTE TIX -- TRANSIT TIME TO X BOUNDARY
      XBL=(AINT((XP(J)-WLLX(JW))/WGRINT(JW)))*WGRINT(JW) +WLLX(JW)
      XBU=XBL+WGRINT(JW)
      YBL=(AINT((YP(J)-WLLY(JW))/WGRINT(JW)))*WGRINT(JW) +WLLY(JW)
      YBU=YBL+WGRINT(JW)
      ASSIGN 917 TO N1
      IF(VX(JWAD))161,162,163
 161  TIX=(XBL-XP(J))/(VX(JWAD))
      GOTO 164
 162  TIX=100000.0
      ASSIGN 918 TO N1
      GO TO 164
 163  TIX=(XBU-XP(J))/(VX(JWAD))
C
C     COMPUTE TIY -- TRANSIT TIME TO Y BOUNDARY
 164  ASSIGN 919 TO N2
      IF(VY(JWAD))165,166,167
 165  TIY=(YBL-YP(J))/(VY(JWAD))
      GO TO 168
 166  TIY=100000.0
      ASSIGN 920 TO N2
      GO TO 168
 167  TIY=(YBU-YP(J))/(VY(JWAD))
C
C     COMPUTE TIZ -- TRANSIT TIME TO Z BOUNDARY
C 168 IS PARTICLE MOVING UP OR DOWN.   UP TO 171
 168  IF(VPZ)169,170,171
C
C 169 IS PARTICLE BELOW MAX TOPO HEIGHT.    YES TO 1691
 169  IF (ZP(J)-YTOPO)1691,1691,1693
C
```

```
C     1693 IS MAX TOPO HEIGHT ABOVE SLICE BOTTOM.  YES TO 1692
 1693 IF (TTOPO-BOTHIT(JW))1691,1691,1692
 1692 TIZ = (TTOPO-ZP(J))/VPZ
      GO TO 1711
 1691 TIZ=(BOTHIT(JW)-ZP(J))/VPZ
      GO TO 1711
 170  TIZ=100000.0
      GO TO 1711
 171  TIZ=(BOTHIT(JW+1)-ZP(J))/VPZ
C
C1711 FIND THE EARLIEST INTERSECTION WITH A LOCAL CIRCULATION SYSTEM
 1711 CIRMIN=TLIMIT
C     ARE THERE ANY LOCAL CIRCULATION SYSTEMS.   YES TO 1712
      IF(NLOCIR)172,172,1712
C
C 1712 COMPUTE TIME OF FLIGHT TO EACH OF THE FOUR VERTICAL PLANES THAT
C     BOUND THE LJ-TH LOCAL CIRCULATION CELL.
 1712 DO 1713 LJ=1,NLOCIR
      GO TO (917,918),N1
 918  TX1=1000000.0
      TX2=1000000.0
      GO TO 921
 917  TX1=(CRMINX(LJ)-XP(J))/VX(JWAD)
      TX2=(CRMAXX(LJ)-XP(J))/VX(JWAD)
 921  GO TO (919,920),N2
 920  TY1=1000000.0
      TY2=1000000.0
      GO TO 922
 919  TY1=(CRMINY(LJ)-YP(J))/VY(JWAD)
      TY2=(CRMAXY(LJ)-YP(J))/VY(JWAD)
C
C     TEST  X INTERCEPTS
C     IS THE FIRST X DIRECTION INTERCEPT IN TNE PAST.  YES TO 1714
 922  IF(TX1)1714,1716,1716
C
C 1714 IS THE SECOND X DIRECTION INTERCEPT ALSO IN THE PAST.  IF YES,
C     BOTH X DIRECTION INTERCEPTS ARE IN THE PAST AND THE PARTICLE WILL
C     NOT INTERSECT THIS CELL.  GO TO 1713 TO CONSIDER THE NEXT CELL.
 1714 IF(TX2)1713,1715,1715
 1715 TMINX=TX1
      TMAXX=TX2
      GO TO 1717
 1716 IF(TX2)1718,1719,1719
 1718 TMINX=TX2
      TMAXX=TX1
      GO TO 1717
C
C 1719 BOTH X INTERCEPTS ARE IN THE FUTURE
 1719 IF(TX1-TX2)1715,1715,1718
C
C 1717 NOW TEST FOR Y INTERCEPTS
 1717 IF(TY1)1720,1721,1721
 1720 IF(TY2)1713,1723,1723
 1723 TMINY=TY1
      TMAXY=TY2
      GO TO 1724
 1721 IF(TY2)1725,1726,1726
 1725 TMINY=TY2
      TMAXY=TY1
      GO TO 1724
```

```
C
C 1726 BOTH Y INTERCEPTS ARE IN THE FUTURE
 1726 IF(TY1-TY2)1723,1723,1725
C 1724 NOW SELECT FIRST INTERCEPT
C
C      SELECT THE SECOND PLANE PIERCE  (LAST OF FIRSTX,FIRSTY)
 1724 IF(TMINX-TMINY)1727,1728,1728
 1728 TS=TMINX
      TC=TMAXY
      GO TO 1729
 1727 TS=TMINY
      TC=TMAXX
 1729 IF(TS-TC)1730,1713,1713
C
C 1730 KEEP TIME OF EARLIEST INTERCEPT
 1730 IF(TS-CIRMIN)1731,1713,1713
 1731 CIRMIN=TS
 1713 CONTINUE
C******* * * * * * *    TEMP     * * * * * * *********
      WRITE (ISOUT,11)CIRMIN
C
C      AT THIS POINT CIRMIN CONTAINS THE TIME OF THE FIRST INTERCEPT
C      BETWEEN PARTICLE AND A LOCAL CIRCULATION SYSTEM
C 172 NOW SELECT EARLIEST BOUNDARY
 172  IF(TIX-TIY)173,175,175
 173  IF(TIX-TIZ)176,178,178
 176  TSM=TIX
      IR=1
      GO TO 179
C
C 178 SET SMALLEST TIME OF FLIGHT STORAGE AT THE TIME OF FLIGHT TO THE
C      Z BOUNDARY
 178  TSM=TIZ
      IR=3
      GO TO 179
 175  IF(TIY-TIZ)180,178,178
 180  TSM=TIY
      IR=2
C
C 179 IS INTERSECTION WITH LOCAL SYSTEM PRIOR TO EARLIEST BOUNDARY
C      INTERCEPT.    YES TO 1792
 179  IF(TSM-CIRMIN)1791,1793,1792
 1792 TSM=CIRMIN
 1793 IR=5
C
C 1791  DOES TIME LIMIT COME BEFORE EARLIEST OTHER BOUNDARY. YES TO 182
 1791 IF(TSM+TP(J)-ENDTIM)181,182,182
C
C 182  TRANSPORT PARTICLE UNTIL ENDTIM
 182  TSM=ENDTIM-TP(J)
      IR=4
      GO TO 3067
C
C 181 TEST FOR EXCESSIVELY SMALL MOVEMENT
  181 GO TO(5980,5570),MPNT
 5570  WRITE (ISOUT,11) TSM,VPZT,VPZ,TIY,FV
 5980 IF(TSM-EPSIL)3050,3050,3067
C
C      SPECIAL TRANSPORT IN THE EVENT OF EXCESSIVELY SMALL TSM
 3050 GO TO IPAS,(3052,3053)
```

```
C
 3052 ASSIGN 3053 TO IPAS
      JWAD1=JWAD
      VPZT=VPZ
      TSM=EPSIL
      GO TO 1811
 3053 IF(VPZT*VPZ)3054,3055,3055
 3054 VPZ=0.0
      TIZ=TLIMIT
      GO TO 3056
 3055 VPZ=(VPZ+VPZT)/2.0
C
C     IF VECTORS ARE OF OPPOSITE SIGNS, USE A ZERO
 3056 IF(VX(JWAD)*VX(JWAD1))3057,3058,3058
 3057 VPX=0.0
      TIX=TLIMIT
      GO TO 3059
 3058 VPX=(VX(JWAD)+VX(JWAD1))/2.0
C
 3059 IF(VY(JWAD)*VY(JWAD1))3060,3061,3061
 3060 VPY=0.0
      TIY=TLIMIT
      GO TO 3062
C
 3061 VPY=(VY(JWAD)+VY(JWAD1))/2.0
 3062 TWND=ENDTIM-TP(J)
      TSM=AMIN1(TIX,TIY,TIZ,CIRMIN,TWND)
      IF(TSM-TWND)3065,3064,3065
 3064 IR=4
      GO TO 3066
 3065 IR=5
      TSM=TSM+EPSIL
      TP(J)=TP(J)+TSM
C
 3066 XP(J)=XP(J)+VPX*TSM
      YP(J)=YP(J)+VPY*TSM
      ZP(J)=ZP(J)+VPZ*TSM
      GO TO 3063
 3067 ASSIGN 3052 TO IPAS
C
C 3051IS PARTICLE BELOW MAXIMUM TOPO HEIGHT    NO TO 1811
 3051 IF(ZP(J)-TTOPO)1812,1812,1811
 1812 GO TO ITT,(188,1813)
C
C 1813 TRANSPORT PARTICLE FOR TSM BY STEPS OF DTMAC CHECKING TOPO AS WE
C       GO
C     COMPUTE MOVEMENT INCREMENTS FOR X,Y, AND Z DIRECTIONS
 1813 XIN=DTMAC*VX(JWAD)
      YIN=DTMAC*VY(JWAD)
      ZIN=DTMAC*VPZ
 1814 XP(J)=XP(J)+XIN
      YP(J)=YP(J)+YIN
      ZP(J)=ZP(J)+ZIN
      TP(J)=TP(J)+DTMAC
      TSM=TSM-DTMAC
C
C     TEST FOR PARTICLE IMPACT ON TOPOGRAPHY
      X=XP(J)
      Y=YP(J)
      CALL HEIGHT(X,Y,H)
```

```
      IF(H+20000.0)1872,1872,1815
 1815 IF(H+10000.0)1875,1875,1816
 1816 IF(H-ZP(J))1817,188,188
 1817 IF(TSM)189,189,1811
C
C 1811 TRANSPORT PARTICLE FOR TSM
C     FIRST INCREASE TSM TO ASSURE THAT THE PARTICLE WILL ACHIEVE ITS
C     BOUNDARY
 1811 TSM=TSM*1.000001
      XP(J)=XP(J)+VX(JWAD)*TSM
      YP(J)=YP(J)+VY(JWAD)*TSM
      ZP(J)=ZP(J)+VPZ*TSM
      TP(J)=TP(J)+TSM
 3063 CONTINUE
C
C     ARE TRANSPORT TRACES TO BE WRITTEN..  YES TO 5550
      GO TO (5560,5550),MPNT
 5550 WRITE(ISOUT,12)XP(J),YP(J),ZP(J),TP(J),TSM,NTI,NG,NTO,NW,NLOST,
     1IR
C
C     TEST FOR PARTICLE IMPACT ON TOPOGRAPHY
 5560 IF(ZP(J)-TTOPO)187,187,189
C
C 189 PARTICLE IS NOT GROUNDED.  ADJUST INDICES JW AND JWAD AND THEN
C     RECYCLE.
 189  GO TO (250,250,252,159,195),IR
 159  NTI=NTI+1
      TP(J)=ENDTIM
      GO TO 160
 250  JW=-JW
      GO TO 1950
 252  IF(VZ(JWAD))258,258,259
 258  JW=1-JW
      GO TO 1961
 259  JW=-(JW+1)
 270  GO TO 1961
 187  GO TO IT,(188,1871)
 1871 X=XP(J)
      Y=YP(J)
      CALL HEIGHT(X,Y,H)
      IF(H+20000.0)1872,1872,1874
 1874 IF(H+10000.0)1875,1875,1876
C
C 1872 H=-20000.0    PARTICLE BEYOND SPECIFIED TOPO
 1872 FMAS(J)=-FMAS(J)
      TP(J)=TLIMIT
      NLOST=NLOST+1
      GO TO 160
C
C 1875  H=-10000.0    PARTICLE BEYOND IN-CORE TOPO
 1875 TP(J)=-TP(J)
      NTO=NTO+1
      IF(JTOP1)160,1877,160
 1877 JTOP1=-1
      GO TO 160
 1876 IF(H-ZP(J))189,188,188
C
C 188  TAKES CARE OF GROUNDED PARTICLES
 188  FMAS(J)=-FMAS(J)
      TP(J)=-TP(J)
```

```
      NG=NG+1
 160  CONTINUE
C
C ***********************************************************************
C
C     END OF MAIN TRANSPORT LOOP
C
C ***********************************************************************
C
      IF(JDONE-1)1000,100,1000
C
C     ARE ANY PARTICLES ON THE OFF THE TOPO TAPE
 100  IF(JTOP1)105,104,105
C     JTOP1 GR    ZERO INDICATES SOME PARTICLES ARE ON OFF TOPO TAPE
C     A NEGATIVE JTOP1 INDICATES PARTICLES IN OFF TOPO BUFFER BUT NOT
C     ON THE OFF TOPO TAPE
C
C     ARE ANY PARTICLES ON THE OUT OF WIND FIELD TAPE
 104  IF(JWIND1)130,200,130
C 200  IS PARTICLES ALOFT TIME BOUNDARY TAPE IN USE $$
 200  IF(JTIME1)203,203,201
 203  IF(NTI)2021,2031,2021
 2021 JTIME1=-1
      JDONE = 1
      GO TO 202
 2031 ENDTIM=TLIMIT
      GO TO 202
 201  WRITE(IPAROT)NUL
      REWIND IPAROT
      REWIND IPARIN
      ITEMP=IPARIN
      IPARIN =IPAROT
      IPAROT=ITEMP
      JTIME1=0
      IF(NTI)2022,202,2022
 2022 JTIME1=-1
 202  IEXEC=2
      RETURN
C
C     A NEGATIVE JWIND1 INDICATES SOME PARTICLES ARE IN THE OUT OF THE
C     WIND FIELD BUFFER BUT NOT ON TAPE
C     JWIND1 GREATER THAN ZERO INDICATES PARTICLES ARE ON THE OUT OF
C     THE WIND FIELD TAPE
C
C
C  105 GET THE REQUIRED TOPO DATA FROM TAPE
C     105 TO 107 SCANS BUFFER PARTICLE COUNTERS TO DETERMINE NEXT NEEDED
C     TOPO DATA BLOCKS AND CHOOSES THE NEAREST ONE FOR READING.
C
C     NBLC   IS SET BY THE INITIALIZING PROGRAM WHICH READS THE TOPO
C     TAPES IDENTIFICATION RECORDS
C     NINTAR(J) IS SET BY THE TRANSPORT LOOP WHEN PARTICLES LEAVE TOPO
C     AND RESET WHEN OFF-TOPO BUFFER IS EMPTIED.
C
 105  JTEST=1000
      DO 107 J=1,NBLCK
      JTEST1=NINTAR(J)
      IF(JTEST1)107,107,108
 108  JTEST2=JFTOPO-J+1
      IF(JTEST2)109,110,111
```

```
 110  IRROR=-110
C
C     SEEKS THE FILE IN CORE. SHOULD NEVER HAPPEN. GO TO A STOP EXIT.
      GO TO 300
 111  IF(JTEST2-JTEST)112,107,107
 112  JTEST=JTEST2
      GO TO 140
 109  IF(JTEST+JTEST2)107,107,113
 113  JTEST=-JTEST2
 140  JF=J
 107  CONTINUE
C
C     AT THIS POINT JF HAS THE NUMBER OF THE DESIRED FILE
C     NOW MOVE TAPE TO SELECTED FILE
      IF(JF-JFTOPO)1072,1071,1071
C
C 1071 PREPARE TO MOVE FORWARD ON IHTOPO.  COMPUTE NUMBER OF BLOCKS TO
C     READ IN
 1071 JR=JF-JFTOPO+1
      GO TO 1074
C
C 1072 DESIRED FILE IS BEHIND READ HEAD.  BACK UP TO GET IT.
 1072 REWIND IHTOPO
C
C     NOW SKIP OVER INITIAL RECORDS
      READ (IHTOPO)TST
      READ (IHTOPO)TST,TST,TST,TST,TST
      READ (IHTOPO)TOPOLM
      READ (IHTOPO)ITOPLM
      JR=JF
C
C 1074 NOW READ UP THROUGH THE DESIRED BLOCK
 1074 DO 1073 J=1,JR
 1073 CALL RDTOPO(J)
C
C 116 RESET ALL OFF-TOPO PARTICLES
 116  DO 118 J=1,NALOFT
      IF(FMAS(J))117,118,118
 117  IF(TP(J))119,118,118
 119  IF(TP(J)-TLIMIT)120,118,120
 120  FMAS(J)=-FMAS(J)
      TP(J)=-TP(J)
 118  CONTINUE
      IF=NALOFT
      IF(JTOP1)1151,115,115
 1151 JTOP1=0
      JTIME1=-1
      GO TO 1001
C
C 115 REWIND OFF TOPO AND PARTICLES ALOFT TAPES AND SWAP NAMES
 115  WRITE(IOTOPO)NUL
      REWIND IOTOPO
      REWIND IPARIN
      ITEMP=IOTOPO
      IOTOPO=IPARIN
      IPARIN=ITEMP
      JTOP1=0
      GO TO 1001
C
C 130  GET THE REQUIRED WIND FIELD DATA FROM TAPE
```

```
 130  GO TO 124
C   INSERT CODE HERE
C
C      RESET ALL IN-CORE OUT-OF-WIND-FIELD PARTICLE KEYS
 124  DO 122 J=1,NALOFT
      IF(FMAS(J)) 1241,122,122
 1241 IF(TP(J))122,122,1242
 1242 IF(TP(J)-TLIMIT)1243,122,1243
 1243 FMAS(J)=-FMAS(J)
 122  CONTINUE
      IF=NALOFT
      IF(JWIND1)123,125,125
 123  JWIND1=0
      JTIME1=-1
      GO TO 1001
C 125 REWIND OUT OF WIND AND PARTICLES ALOFT TAPES AND SWAP NAMES
 125  WRITE (IOWIND,10)NUL
      JWIND1=0
      REWIND IOWIND
      REWIND IPARIN
      ITEMP=IOWIND
      IOWIND=IPARIN
      IPARIN=ITEMP
      GO TO 1001
C
      END
$IBFTC CBRE11  LIST,DECK,M94/2
      SUBROUTINE CBREZ1(J,K,AX,AY,AZ)
C     11 OCT 66
C     I. KOHLBERG, T.W.SCHWENKE  TECHNICAL OPERATIONS RESEARCH, INC.
C     THIS SUBROUTINE SERVES THE DUAL PURPOSE OF READING SEA BREEZE
C     DATA(WHEN THE SIGN OF ARGUMENT J IS MINUS) AND COMPUTING THE
C     SEA BREEZE FOR THE J-TH PARTICLE.
C
C ******************************************************************
C
      COMMON /SET1/
     1         DIAM   , DETID  , IRISL  , IEXEC  , ISIN   , ISOUT    ,
     2         SD     , SPAR   , SSAM   , THE    , TMP1   , TMP2     ,
     3         T2M    , U      , VPR    , W      , X      , Z        ,
     4         WHY    , RMIN   , IDISTR , SPAR1  , SPAR2  , SPAR3    ,
     5         SPAR4  , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9
C
C ******************************************************************
C
      DIMENSION  DETID(12),WHY(40)
      COMMON /SET2/
     1         S      , SUBSID , GRINT  , BXLL   , BXLU   , BYLL
     2,        BYLU   , TXLL   , TXLU   , TYLL   , TYLU   , XGZ
     3,        YGZ    , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM
     4,        KLIM   , II     , JJ     , KK     , XP     , YP
     5,        ZP     , FMAS   , TP     , PS     , VX     , VY
     6,        VZ     , IL     , JL     , IBADD  , WGRINT , NSTRAT
     7,        WLLX   , WLLY   , WURX   , WURY   , BOTHIT , IPARIN
     8,        IOTOPO , IOWIND , IHTOPO , IPOUT  , IPAROT , JTOP1
     9,        JWIND1 , IRROR  , TLIMIT , ENDTIM , IC     , IBYPAS
     1,        JTOPJ  , NLOST  , NG     , NTO    , NTI    , NW
     2,        NALOFT , JTIME1 , NBMAX  , NFREE  , N      , NCL
     3,        CRMAXY , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY
     4,        UO     , SN     , CS     , NLOCIR , DTLOC  , ATEMP
```

```
     5,        RHO     , NA      , TUZ     , DTMAC   , FROG    , CRMAXX
     6,        ROPART
      DIMENSION TOPOLM(4,4)   ,NINTAR(4)        ,ITOPLM(3,4)
      DIMENSION S(10,10)      ,SUBSIC(400)      ,IC(18)
      DIMENSION XP(200)       ,YP(200)          ,ZP(200)          ,FMAS(200)
      DIMENSION TP(200)       ,PS(200)          ,ATEMP(260)       ,RHO(260)
      DIMENSION VX(1500)      ,VY(1500)         ,VZ(1500)         ,IL(70)
      DIMENSION JL(70)        ,IBADD(70)        ,WURX(70)
      DIMENSION WGRINT(70)                      ,WLLX(70)         ,WLLY(70)
      DIMENSION WURY(70)      ,BOTHIT(70)       ,SN(6)            ,CS(6)
      DIMENSION CRMINX(6)     ,CRMAXX(6)        ,CRMINY(6)        ,CRMAXY(6)
      DIMENSION CRUHT(6)      ,NCRTYP(6)        ,UO(6)
C
C ********************************************************************
C     PARAMETERS  PECULIAR TO CBREZ
      DIMENSION AJZX(9),AJXX(9),FAX(9),R1IX(9),R2IX(9),R1RX(9),
     1R2RX(9),CON1X(9),CON2X(9),CAN1X(9),CAN2X(9),CNN1X(9),
     2CNN2X(9),SNN1X(9),SNN2X(9),OMGX(9),DELTX(9),TAUX(9)
C
C*******************SEA BREEZE GLOSSARY*******************************
C
C      ACCG          GRAVITATIONAL CONSTANT (METERS/SQR. SECOND)
C      AKY           THERMAL EDDY DIFFUSIVITY (SQR.METERS/ SECOND)
C      AX            WIND VECTOR EAST     (METERS/SECOND)
C      AY            WIND VECTOR NORTH    (METERS/SECOND)
C      AZ            WIND VECTOR VERTICAL  (METERS/SECOND)
C      B             THE ANGLE (MEASURED CLOCKWISE FROM TRUE NORTH) THAT
C                    DESCRIBES THE ORIENTATION OF THE SHORE LINE.  FOR B
C                    EQUAL TO ZERO,THE SEA IS ON THE LEFT HAND SIDE OF THE
C                    SHORELINE. (RADIANS)
C      BB            A GENERAL PURPOSE VARIABLE USED FOR
C                       CONSTANT STORAGE IN READ ROUTE,
C                       WIND VECTOR PERPENDICULAR TO SHORE
C      CRUHT         HEIGHT OF THE SEA BREEZE CELL    (METERS)
C      DELTX(N)      MAXIMUM TEMPERATURE DIFFERENTIAL FOR THE N-TH
C                    HARMONIC  (DEGREES KELVIN)
C      ELX           TOTAL EXTENT OF THE SEA BREEZE CELL (METERS)
C      GRAD          INITIAL TEMPERATURE GRADIENT (DEGREES KELVIN /METER)
C      NN            NUMBER OF HARMONICS
C      SGMA          GULDBERG-MOHN PARAMETER  (1/ SECONDS)
C      SNPHI         SINE OF THE LATITUDE OF THE SEA BREEZE CELL
C      TAUX(N)       PHASE LAG OF N-TH HARMONIC    (RADIANS)
C      THET          AVERAGE GROUND TEMPERATURE (DEGREES KELVIN)
C      XS            A GENERAL PURPOSE VARIABLE USED FOR
C                       PERPENDICULAR DISTANCE FROM SHORE LINE,
C                       PERPENDICULAR DISTANCE FORM EDGE OF PRIMARY CELL,
C                       ATTENUATION CONSTANT
C
C ********************************************************************
C
 1    FORMAT(4F10.3,I10)
 2    FORMAT(//45X24HLOCAL CIRCULATION NUMBER16/50X12HSEA BREEZE 1/ )
 3    FORMAT(16X9HSINE   OF 9X13HGULDBERG-MOHN8X10HNUMBER OF 7X16HTOTAL
     1EXTENT OF5X11HAVG. GROUND/16X8HLATITUDE12X9HPARAMETER9X12H HARMONI
     2CS  6X15HSEA BREEZE CELL6X11HTEMPERATURE/16X9H          10X11H(1/SE
     3CONDS)30X9H (METERS)8X16H(DEGREES KELVIN)/ 10X2E19.8,9XI3,11X,
     42E19.8,/// 5X11HATTENUATION8X12HTHERMAL EDDY7X15HCOASTLINE ANGLE8X
     513HINITIAL TEMP.10X9H  PHASE  ,6X,16H   TEMPERATURE  /6X8HCONSTANT
     611X,11HDIFFUSIVITY7X15HFROM TRUE NORTH8X8HGRADIENT10X,3HLAG9X16H
     7DIFFERENTIAL  /5X10H(1/METERS)6X18H(SQR. METERS/SEC.)7X9H(RADIANS)
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     86X22H(DEGREES KELVIN/METER),6X9H(RADIANS),6X16H(DEGREES KELVIN)/,
     9 4E19.8,13X, 9H TAUX(N) ,10X8HDELTX(N),////)
 4    FORMAT(2F10.3)
 20   FORMAT(//45X,36HCOORDINATES OF LOCAL CELL BOUNDARIES/,30X,5HNORTH,
     110X,5HSOUTH,11X,4HEAST,11X,4HWEST,10X,6HHEIGHT/,22X,5F15.3///)
 21   FORMAT(//23X74HTHE N-TH HARMONIC CONSTANT COEFFICIENTS USED IN CAL
     1CULATING THE WIND FIELD//)
 22   FORMAT(5X,6H OMGN(,I1,2H)=,E16.8,  5X,6H  AJZ(,I1,2H)=,E16.8,
     1         5X,6H  AJX(,I1,2H)=,E16.8,  5X,6H  AJY(,I1,2H)=,E16.8,/
     2         5X,6H AKN1(,I1,2H)=,E16.8,  5X,6H ALN1(,I1,2H)=,E16.8,
     3         5X,6H AKN2(,I1,2H)=,E16.8,  5X,6H ALN2(,I1,2H)=,E16.8,/
     4         5X,6HBLOW1(,I1,2H)=,E16.8,  5X,6HBLOW2(,I1,2H)=,E16.8,
     5         5X,6H ANN1(,I1,2H)=,E16.8,  5X,6H ANN2(,I1,2H)=,E16.8,/
     6         5X,6H PHIN(,I1,2H)=,E16.8,  5X,6H  ENU(,I1,2H)=,E16.8,
     7         5X,6HDELTX(,I1,2H)=,E16.8,  5X,6H TAUX(,I1,2H)=,E16.8///)
C
C ***********************************************************************
C
      DATA PROGRM/6HCBREZ1/
C
C ***********************************************************************
C ***********************************************************************
C
      IF(J)100,101,102
 101  IRROR=-101
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)
C 100 THIS IS THE DATA READING ROUTE
C
 100  READ (ISIN,1)SNPHI,SGMA,ELX,THET
      READ (ISIN,1)WW,AKY,B,GRAD,NN
      READ (ISIN,4)(DELTX(N),TAUX(N),N=1,NN)
      WRITE (ISOUT,2)K
      ALM=6.2831853/ELX
      ALPH=9.8/THET
      COR=(14.544410E-05)*SNPHI
      DO 2000 N=1,NN
      OMGX(N)=N
      OMGX(N)=OMGX(N)*7.2722052E-05
      A2=SGMA*SGMA+OMGX(N)*OMGX(N)
      A1=SQRT(A2)
      IF(SGMA)1003,1003,1004
C1003 SGMA IS ZERO OR NEGATIVE.  THIS IS NOT ALLOWED
 1003 IRROR=1003
      GO TO 7734
 1004 T1=-ATAN(OMGX(N)/SGMA)
      T2=-2.0*T1
      SOC=SGMA**2-OMGX(N)**2+COR**2
      A3=SQRT(SOC**2+4.0*SGMA**2*OMGX(N)**2)
      IF(SOC)1005,1055,1555
 1005 T3=ATAN(2.0*OMGX(N)*SGMA/SOC)+ 3.1415927
      GO TO 5555
 1055 T3=1.5707963
      GO TO 5555
 1555 T3=ATAN(2.0*OMGX(N)*SGMA/SOC)
 5555 A4=(A2*ALM**2)/A3
      T4=T2-T3
      A5=(A1*ALPH*ALM**2 )/A3
      T5=-T1-T3
      IF(AKY)1006,1006,1606
C1006 AKY  IS ZERO OR NEGATIVE.  THIS IS NOT ALLOWED
```

```
 1006 IRROR=1006
      GO TO 7734
 1606 A6=OMGX(N)/AKY
      A7=GRAD/AKY
      ACOT4 = A4*COS(T4)
      ASIT4 = A4*SIN(T4)+A6
      B1=ACOT4*ACOT4-ASIT4*ASIT4-4.0*(A7*A5*COS(T5)-A6*A4*SIN(T4))
      B2=2.0*ACOT4*ASIT4-4.0*(A6*ACOT4+A5*A7*SIN(T5))
      IF(B1)1007,1077,1777
 1007 BETA=ATAN(B2/B1) + 3.1415927
      GO TO 7777
 1077 IF(B2)9007,9007,9077
 9007 BETA=4.7123890
      GO TO 7777
 9077 BETA=1.5707963
      GO TO 7777
 1777 BETA=ATAN(B2/B1)
 7777 AM=BETA/2.0
      BB=(B1*B1+B2*B2)**0.25
      ACOSM=COS(AM)*BB/2.0
      ASINM=SIN(AM)*BB/2.0
      ACOT4=ACOT4/2.0
      ASIT4=ASIT4/2.0
      C1= ACOT4+ACOSM
      D1= ASIT4+ASINM
      C2=ACOT4-ACOSM
      D2= ASIT4-ASINM
      IF(C1)1008,1088,1888
 1008 GAM1=ATAN(D1/C1) + 3.1415927
      GO TO 8888
 1088 IF(D1)9008,9008,9088
 9008 GAM1=4.7123890
      GO TO 8888
 9088 GAM1=1.5707963
      GO TO 8888
 1888 GAM1=ATAN(D1/C1)
 8888 IF(C2)1009,1099,1999
 1009 GAM2=ATAN(D2/C2) + 3.1415927
      GO TO 1111
 1099 IF(D2)9009,9009,9099
 9009 GAM2=4.7123890
      GO TO 1111
 9099 GAM2=1.5707963
      GO TO 1111
 1999 GAM2=ATAN(D2/C2)
 1111 SRTE1=(C1*C1+D1*D1)**0.25
      SRTE2=(C2*C2+D2*D2)**0.25
      AN1=GAM1/2.0
      AN2=GAM2/2.0
      CON1=COS(AN1)
      CON2X(N)=COS(AN2)
      CAN1=SIN(AN1)
      CAN2X(N)=SIN(AN2)
      IF(CON1)5,5,66
    5 R1RX(N)=SRTE1*CON1
      R1IX(N)=SRTE1*CAN1
      EPS1=1.0
      GO TO 7
   66 R1RX(N)=-SRTE1*CON1
      R1IX(N)=-SRTE1*CAN1
```

```
      EPS1=-1.0
 7    IF(CON2X(N))8,8,9
 8    R2RX(N)= SRTE2*CON2X(N)
      R2IX(N)=SRTE2*CAN2X(N)
      EPS2=1.0
      GO TO 10
 9    R2RX(N)=-SRTE2*CON2X(N)
      R2IX(N)=-SRTE2*CAN2X(N)
      EPS2=-1.0
 10   IF(N-1)7730,110,131
 7730 IRROR=7730
      GO TO 7734
C DETERMINATION OF HEIGHT OF SEA BREEZE
 110  HT1=-1.0/R1RX(N)
      HT2=-1.0/R2RX(N)
C     CRUHT(K) IS THE HEIGHT OF THE SEA BREEZE CELL.
      IF(HT1-HT2)11,11,12
 11   CRUHT(K)=2.0*HT2
      GO TO 13
 12   CRUHT(K)=2.0*HT1
 13   WRITE (ISOUT,20)CRMAXY(K),CRMINY(K),CRMAXX(K),CRMINX(K),CRUHT(K)
      WRITE (ISOUT,3)SNPHI,SGMA, NN,FLX,THET,WW,AKY,B,GRAD
      WRITE (ISOUT,21)
 131  FAX(N)=T5-AM+TAUX(N)
      G=-COR/A1
C
C     COMPUTATIONS FOR CONSTANT COEFFICIENTS OF THE WIND FIELD
      AJ7X(N)=-DFLTX(N)*A5/BB
      AJXX(N)=AJ7X(N)/ALM
      AJY=AJXX(N)*G
      ESQ1=EPS1*SRTE1
      ESQ2=EPS2*SRTE2
      AMG=ESQ1/ESQ2
      CNN1X(N)=COS(AN1+T1)*AMG*G
      CNN2X(N)=COS(AN2+T1)*G
      SNN1X(N)=SIN(AN1+T1)*AMG*G
      SNN2X(N)=SIN(AN2+T1)*G
      CON1X(N)=CON1*AMG
      CAN1X(N)=CAN1*AMG
      WRITE (ISOUT,22) N,OMGX(N),N,AJZX(N),N,AJXX(N),N,AJY,N,R1RX(N),N,R
     11IX(N),N,R2RX(N),N,R2IX(N),N,ESQ1,N,ESQ2,N,AN1,N,AN2,N,FAX(N),N,T1
     2,N,DELTX(N),N,TAUX(N)
 2000 AJXX(N)=AJXX(N)*ESQ2
      ELX=ELX/2.0
C1013 COMPUTE CENTER OF SEA BREEZE CELL.
 1013 XCB=(CRMAXX(K)+CRMINX(K))/2.0
      YCB=(CRMAXY(K)+CRMINY(K))/2.0
      COSB=COS(B)
      SINB=SIN(B)
 105  RETURN
C
C     THIS IS THE COMPUTING ROUTE
C
C102  TEST FOR IMPACTED PARTICLE
 102  IF(ZP(J)) 1019,1020,1020
 1019 AX=0.0
      AY=0.0
      AZ=-1.0E+8
      GO TO 105
C
```

```
C1020 PARTICLE IS ALOFT
C     THIS CARD ROTATES AND TRANSLATES THE MACRO SYSTEM COORDINATES
C     INTO THE SEA BREEZE CELL COORDINATES.
 1020 XS=(XP(J)-XCB)*COSB-(YP(J)-YCB)*SINB
      ARG=ALM*XS
C     THE FOLLOWING CARDS ATTENUATE THE WIND FIELD IN THE ADJACENT
C     REGION.
      XS=ELX-ABS(XS)
      IF(XS)130,1030,103
 130  XS=XS*WW
      GO TO 1030
 103  XS=0.0
 1030 BB=0.0
      AY=0.0
      AZ=0.0
      DO 3000 N=1,NM
C     THE FOLLOWING TEN CARDS COMPUTE WIND FIELD COEFFICIENTS.
      ATTN1=EXP(XS+R1RX(N)*ZP(J))
      ATTN2=EXP(XS+R2RX(N)*ZP(J))
      AAGG=OMGX(N)*TP(J)+FAX(N)
      ARW1=R1IX(N)*ZP(J)+AAGG
      ARW2=R2IX(N)*ZP(J)+AAGG
      SARW1=SIN(ARW1)*ATTN1
      SARW2=SIN(ARW2)*ATTN2
      CARW1=COS(ARW1)*ATTN1
      CARW2=COS(ARW2)*ATTN2
      AAGG=AJXY(N)*COS(ARG)
C     THE FOLLOWING FIVE CARDS ARE THE WIND FIELD
      AZ=AJZX(N)*SIN(ARG)*(CARW1-CARW2) +AZ
      BB=AAGG*(CARW1*CON1X(N)-SARW1*CAN1X(N)-CARW2*CON2X(N)+SARW2*
     1CAN2X(N)) +BB
 3000 AY=AAGG*  (CARW1*CNN1X(N)-SARW1*SNN1X(N)-CARW2*CNN2X(N)+SARW2*
     1SNN2X(N)) +AY
C 15  DEROTATION OF THE WIND VECTORS INTO THE MACROSYSTEM
 15   AX=BB*COSB+AY*SINB
      AY=-BB*SINB+AY*COSB
      GO TO 105
      END
$IBFTC GETWN    LIST,DECK,M94/2
      SUBROUTINE GETWND(XX,YY,ZZ,JWAD,JW)
C     28 NOVEMBER 1966
C     T.W. SCHWENKE    TECHNICAL OPERATIONS RESEARCH
C
C ******************************************************************
C
C     THIS SUBROUTINE RETRIEVES THE MACRO WIND FIELD VECTOR WHICH
C     APPLIES AT THE POINT WHOSE COORDINATES ARE IN THE ARGUMENT WORDS
C     XX,YY, ANDZZ AT ENTRANCE.  THE X,Y, AND Z WIND VECTOR COMPONENTS
C     ARE IN THE COMMON VARIABLES VX(JWAD),VY(JWAD), AND VZ(JWAD) WHEN
C     THE SUBROUTINE RETURNS.  IF AN ENTRANCE IS MADE WITH ARGUMENT JW
C     SET NEGATIVE, JW IS SET POSITIVE AND ITS VALUE IS USED RATHER THAN
C     RECOMPUTED.  UPON EXIT JWAD IS SET NEGATIVE IN THE EVENT THAT THE
C     MACRO WIND FIELD PERTAINING TO THE DESIRED POINT IS NOT AVAILABLE
C     IN CORE.
C
C ******************************   GLOSSARY   ***********************
C
C       JW          INDEX OF THE WIND ARRAY STRATA IN THE MACRO WIND FIELD.
C                   THIS INDEX INCREASES FROM BOTTOM TO TOP OF THE FIELD.
C                   IF NEGATIVE AT ENTRANCE, IT IS SET POSITIVE AND USED BY
```

```
C                   GETWND.  IF ZERO OR POSITIVE AT ENTRANCE, IT IS RE-
C                   COMPUTED BY GETWND.
C      JWAD         AN INDEX FOR THE STORAGE ARRAYS (ONE DIMENSIONAL) FOR
C                   MACRO WIND FIELD VECTORS.  JWAD IS SET NEGATIVE BY
C                   GETWND IF THE NEEDED MACRO WIND FIELD VECTORS ARE NOT
C                   IN CORE.
C      JT           INDEX OF WIND LAYER USED IN A SEARCH FOR THE LAYER CON-
C                   TAINING THE J-TH PARTICLE.   TOP INDEX
C      JTOPJ        INDEX OF THE TOP LAYER IN THE MACRO WIND FIELD DESCRIP-
C                   TION
C      JTST         TEMPORARY STORAGE
C      ZZ           Z COORDINATE OF THE POINT FOR WHICH A MACRO WIND FIELD
C                   VECTOR IS SOUGHT
C      XX           X COORDINATE.    SEE ZZ
C      YY           Y COORDINATE.    SEE ZZ
C      IRROR        NUMBER OF THE STATEMENT NEAR THE POINT WHERE AN ERROR
C                   WAS DISCOVERED
C      WLLX(JW)     LOWER LIMIT FOR X COORDINATES IN THE MACRO WIND FIELD
C      WLLY(JW)     LOWER LIMIT FOR Y COORDINATES IN THE MACRO WIND FIELD
C      WURX(JW)     UPPER LIMIT FOR X COORDINATES IN THE MACRO WIND FIELD
C      WURY(JW)     UPPER LIMIT FOR Y COORDINATES IN THE MACRO WIND FIELD
C      IIW          X DIRECTION WIND FIELD RETRIEVAL INDEX
C      JJW          Y DIRECTION WIND FIELD RETRIEVAL INDEX
C      WGRINT(JW)   GRID INTERVAL FOR THE WIND FIELD IN JW-TH STRATUM IN
C                   METERS
C      IL(JW)       THE NUMBER OF GRID DIVISIONS IN THE X DIRECTION OF THE
C                   WIND FIELD IN STRATUM JW
C      IBADD(JW)    BASE ADDRESS FOR STORING DATA FROM THE JW-TH STRATUM OF
C                   THE WIND FIELD.  THIS IS AN INDEX IN THE 1-D WIND ARRAY
C
C ***********************************************************************
C
      COMMON /SET1/
     1          DIAM   , DETID  , IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2          SD     , SPAR   , SSAM   , TME    , TMP1   , TMP2     ,
     3          T2M    , U      , VPR    , W      , X      , Z        ,
     4          WHY    , RMIN   , IDISTR , SPAR1  , SPAR2  , SPAR3    ,
     5          SPAR4  , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9
      DIMENSION  DETID(12),WHY(40)
C
C ***********************************************************************
C
      COMMON /SET2/
     1          S      , SUBSID , GRINT  , BXLL   , BXLU   , BYLL
     2,         BYLU   , TXLL   , TXLU   , TYLL   , TYLU   , XGZ
     3,         YGZ    , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM
     4,         KLIM   , II     , JJ     , KK     , XP     , YP
     5,         ZP     , FMAS   , TP     , PS     , VX     , VY
     6,         VZ     , IL     , JL     , IBADD  , WGRINT , NSTRAT
     7,         WLLX   , WLLY   , WURX   , WURY   , BOTHIT , IPARIN
     8,         IOTOPO , IOWIND , IHTOPO , IPOUT  , IPAROT , JTOP1
     9,         JWIND1 , IRROR  , TLIMIT , ENDTIM , IC     , IBYPAS
     1,         JTOPJ  , NLOST  , NG     , NTO    , NTI    , NW
     2,         NALOFT , JTIME1 , NBMAX  , NFREE  , N      , NCL
     3,         CRMAXY , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY
     4,         UO     , SN     , CS     , NLOCIR , DTLOC  , ATEMP
     5,         RHO    , NA     , TGZ    , DTMAC  , FROG   , CRMAXX
     6,         ROPART
      DIMENSION TOPOLM(4,4)   ,NINTAR(4)      ,ITOPLM(3,4)
      DIMENSION S(10,10)      ,SUBSID(400)    ,IC(18)
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      DIMENSION XP(200)        ,YP(200)          ,ZP(200)          ,FMAS(200)
      DIMENSION TP(200)        ,PS(200)          ,ATEMP(260)       ,RHO(260)
      DIMENSION VX(1500)       ,VY(1500)         ,VZ(1500)         ,IL(70)
      DIMENSION JL(70)         ,IBADD(70)        ,WURX(70)
      DIMENSION WGRINT(70)                       ,WLLX(70)         ,WLLY(70)
      DIMENSION WURY(70)       ,BOTHIT(70)       ,SN(6)            ,CS(6)
      DIMENSION CRMINX(6)      ,CRMAXX(6)        ,CRMINY(6)        ,CRMAXY(6)
      DIMENSION CRUHT(6)       ,NCRTYP(6)        ,UO(6)
C
C ************************************************************************
C
      DATA PROGRM/6HGETWND/
C
C ************************************************************************
C ************************************************************************
C
C     TEST FOR SPECIAL ENTRANCE FROM MAIN TRANSPORT LOOP WITH JW SET -.
      IF(JW)100,102,102
C 100 SPECIAL ENTRANCE.   MAGNITUDE OF JW IS STILL VALID.
 100  JW=-JW
      GO TO 270
C     REGULAR ENTRANCE    -    COMPUTE JW
C     FIND INDEX OF WIND FIELD LAYER THAT CONTAINS THE POINT XX,YY,ZZ
C     AND STORE IT IN JW.  USE A TWO-BOUNDED BINARY SEARCH.
 102  JT=JTOPJ+1
      JW=1
C
C 153  COMPUTE TRIAL INDEX NUMBER
 153  JTST=(JT+JW)/2
C     HAVE TRIAL TOP AND BOTTOM INDICES CONVERGED TO INDICATE THE
C     DESIRED LAYER.   NO TO 154
      IF(JT-JW-1)155,270,154
C
C 154  IS PARTICLE ABOVE THE BOTTOM OF THE TRIAL LAYER.    NO TO 152
 154  IF(ZZ-BOTHIT(JTST))152,150,150
C 150  PARTICLE IS IN OR ABOVE SLICE JTST.
  150 JW=JTST
      GO TO 153
C 152  PARTICLE IS BELOW SLICE JTST
  152 JT=JTST
      GO TO 153
 155  IRROR=-155
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)
C
C
C 270  IS THE PARTICLE WITHIN THE SPECIFIED WIND FIELD.    NO TO 271
 270  IF(XX-WLLX(JW))271,272,272
C 271 MARK PARTICLE BEYOND SPECIFIED WIND FIELD
 271  JWAD=-1
      GO TO 160
 272  IF(XX-WURX(JW))273,273,271
 273  IF(YY-WLLY(JW))271,275,275
 275  IF(YY-WURY(JW))274,274,271
C
C 274 IS SPECIFIED WIND FIELD IN CORE      ALWAYS YES IN THIS PROGRAM
 274  CONTINUE
C 276      NOW COMPUTE JWAD - THE INDEX OF THE APPLICABLE WIND CELL
 276  IIW=  (XX-WLLX(JW))/WGRINT(JW)
      JJW=  (YY-WLLY(JW))/WGRINT(JW)
      JWAD=IBADD(JW)+(JJW  )*IL(JW)+IIW
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 160  RETURN                                                                GETW
      END                                                                   GETW
$IBFTC HEIGH    LIST,DECK,M94/2                                             HEIG
      SUBROUTINE HEIGHT(XX,YY,H)                                            HEIG
C     11 OCT 66                                                             HEIG
C     THIS SUBROUTINE RETRIEVES TOPO HEIGHT AT HORIZONTAL COORDINATES       HEIG
C     XX,YY AND PUTS IT IN H                                                HEIG
C                                                                           HEIG
C ***********************************************************************HEIG
C                                                                           HEIG
      COMMON /SET1/                                                         HEIG
     1          DIAM    , DETID  , IRISE  , IEXEC  , ISIN   , ISOUT   ,     HEIG
     2          SD      , SPAR   , SSAM   , THE    , TMP1   , TMP2    ,     HEIG
     3          T2M     , U      , VPR    , W      , X      , Z       ,     HEIG
     4          WHY     , RMIN   , IDISTR , SPAR1  , SPAR2  , SPAR3   ,     HEIG
     5          SPAR4   , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9         HEIG
      DIMENSION  DETID(12),WHY(40)                                          HEIG
C                                                                           HEIG
C ***********************************************************************HEIG
C                                                                           HEIG
      COMMON /SET2/                                                         HEIG
     1          S       , SUBSID , GRINT  , BXLL   , BXLU   , BYLL          HEIG
     2,         BYLU    , TXLL   , TXLU   , TYLL   , TYLU   , XGZ           HEIG
     3,         YGZ     , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM          HEIG
     4,         KLIM    , II     , JJ     , KK     , XP     , YP            HEIG
     5,         ZP      , FMAS   , TP     , PS     , VX     , VY            HEIG
     6,         VZ      , IL     , JL     , IBADD  , WGRINT , NSTRAT        HEIG
     7,         WLLX    , WLLY   , WURX   , WURY   , BOTHIT , IPARIN        HEIG
     8,         IOTOPO  , IOWIND , IHTOPO , IPOUT  , IPAROT , JTOP1         HEIG
     9,         JWIND1  , IRROR  , TLIMIT , ENDTIM , IC     , IBYPAS        HEIG
     1,         JTOPJ   , NLOST  , NG     , NTO    , NTI    , NW            HEIG
     2,         NALOFT  , JTIME1 , NBMAX  , NFREE  , N      , NCL           HEIG
     3,         CRMAXY  , CRWHT  , NCRTYP , BZ     , CRMINX , CRMINY        HEIG
     4,         UO      , SN     , CS     , NLOCIR , DTLOC  , ATEMP         HEIG
     5,         RHO     , NA     , TGZ    , DTMAC  , FROG   , CRMAXX        HEIG
     6,         ROPART                                                      HEIG
      DIMENSION TOPOLM(4,4)    ,NINTAR(4)      ,ITOPLM(3,4)                 HEIG
      DIMENSION S(10,10)       ,SUBSID(400)    ,IC(18)                      HEIG
      DIMENSION XP(200)        ,YP(200)        ,ZP(200)       ,FMAS(200)    HEIG
      DIMENSION TP(200)        ,PS(200)        ,ATEMP(260)    ,RHO(260)     HEIG
      DIMENSION VX(1500)       ,VY(1500)       ,VZ(1500)      ,IL(70)       HEIG
      DIMENSION JL(70)         ,IBADD(70)      ,WURX(70)                    HEIG
      DIMENSION WGRINT(70)                     ,WLLX(70)      ,WLLY(70)     HEIG
      DIMENSION WURY(70)       ,BOTHIT(70)     ,SN(6)         ,CS(6)        HEIG
      DIMENSION CRMINX(6)      ,CRMAXX(6)      ,CRMINY(6)     ,CRMAXY(6)    HEIG
      DIMENSION CRWHT(6)       ,NCRTYP(6)      ,UO(6)                       HEIG
C                                                                           HEIG
C ***********************************************************************HEIG
C                                                                           HEIG
C     PRESERVE STD GRID INTERVAL                                            HEIG
      GRIN=GRINT                                                            HEIG
C     IS PARTICLE OVER BLOCK OF TOPOGRAPHY NOW IN CORE                      HEIG
      IF(XX-BXLL)4,2,1                                                      HEIG
    1 IF(XX-BXLU)2,4,4                                                      HEIG
    2 IF(YY-BYLL)4,11,3                                                     HEIG
    3 IF(YY-BYLU)11,4,4                                                     HEIG
C     IS PARTICLE OVER RANGE OF TOPOGRAPHY UNDER STUDY                      HEIG
    4 IF(XX-TXLL)10,6,5                                                     HEIG
    5 IF(XX-TXLU)6,10,10                                                    HEIG
    6 IF(YY-TYLL)10,9,7                                                     HEIG
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    7 IF(YY-TYLU)9,10,10
    8 FORMAT (2F12.4)
C     PARTICLE IS BEYOND IN-CORE TOPO SPECIFICATION BUT WITHIN THE TOPO
C     SPECIFICATION AREA.  H IS SET  -10000.0
    9 H=-10000.0
      GO TO 101
C     PARTICLE IS BEYOND TOPO SPECIFICATION AREA.  H IS SET -20000.0
   10 H=-20000.0
C************************  TEMP   ***********************************
  101 WRITE(ISOUT,8)XX,YY
      GO TO 28
C     FOR PARTICLE OVER TOPO BLOCK NOW IN CORE,FIND COORD OF NEAREST
C     TOPO POINT IN 2 DIM ARRAY (IN NO OF GRINTS FROM LOWER LEFT COR OF
C     BLOCK IN CORE)
   11 I=(XX-BXLL)/GRINT+1.0
      J=(YY-BYLL)/GRINT+1.0
C     H IS TOPO HEIGHT IF SQUARE OF SIDE GRINT TO UPPER RT OF PT(I,J)
C     NOT SUBDIVIDED,A NEG NO IF SUBDIV
      H=S(I,J)
      IF(H)12,28,28
C     SHIFT ORIGIN OF PARTICLE COORD TO LOWER LT OF SQUARE(SIDE,GRINT)
C     UNDER PARTICLE
   12 CI=I
      CJ=J
      CX=XX-BXLL-(CI-1.0)*GRIN
      CY=YY-BYLL-(CJ-1.0)*GRIN
C     DIV SQ GRINT INTO 4 QUADRANTS
      GRIN=GRIN/2.0
C     SHIFT ORIGIN OF PARTICLE COORD TO CENTER OF DIVIDED SQ
      CCX=CX-GRIN
      CCY=CY-GRIN
C     (LOOP STARTS HERE)
C     CONVERT NEG H TO BASE INDEX FOR SUBSID(K)
   13 K=-H+0.5
C     WHICH QUADRANT IS PARTICLE OVER
      IF(CCX)14,15,15
   14 IF(CCY)19,16,16
   15 IF(CCY)17,18,18
C     MODIFY BASE INDEX,REMEMBER QUADRANT
   16 K=K+1
      N=2
      GO TO 20
   17 K=K+3
      N=4
      GO TO 20
   18 K=K+2
      N=3
      GO TO 20
   19 N=1
C     H IS TOPO HT IF QUADRANT NOT SUBDIV IN SUBSID(K),A NEG NO IF DIV
   20 H=SUBSID(K)
      IF(H)21,28,28
C     SUBDIVIDE QUADRANT
   21 GRIN=GRIN/2.0
C     SHIFT ORIGIN OF PARTICLE COORD TO CENTER OF SUBDIVIDED QUADRANT
C     PARTICLE IS OVER
      GO TO(22,24,25,27),N
   22 CCY=CCY-GRIN
   23 CCX=CCX-GRIN
      GO TO 13
```

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   24 CCY=CCY-GRIN
      GO TO 23
   25 CCY=CCY-GRIN
   26 CCX=CCX-GRIN
      GO TO 13
   27 CCY=CCY+GRIN
      GO TO 26
   28 RETURN
      END
$IBFTC LOTRA    LIST,DECK,M94/2
      SUBROUTINE LOTRAN(J,K)
C     11 OCT 66
C     T.W.SCHWENKE       TECHNICAL OPERATIONS RESEARCH
C
C *********************************************************************
C
C     THIS IS THE EXECUTIVE ROUTINE FOR TRANSPORTING PARTICLES WITHIN
C     ALL LOCAL WIND SYSTEMS.
C     IF THE J-TH PARTICLE IS ABOVE THE TOP OF THE LOCAL CIRCULATION
C     CELL, LOTRAN TRANSPORTS IT USING WIND VECTORS RETRIEVED FROM THE
C     MACRO WIND FIELD ARRAYS.  FOR PARTICLES ACTUALLY WITHIN THE LOCAL
C     CIRCULATION CELL IT CALLS THE APPROPRIATE LOCAL CIRCULATION CODE
C     TO OBTAIN AN ESTIMATE OF THE WIND VECTOR AT PARTICLE POSITION.
C     IN EITHER CASE THE PARTICLE TRANSPORTED FOR ONE TIME STEP OF
C     DURATION DTMAC SECONDS.   THIS PROCEDURE IS REPEATED UNTIL THE
C     PARTICLE LEAVES THE LOCAL CELL OR LANDS ON THE ANALYTICALLY
C     DESCRIBED TOPOGRAPHY OR UNTIL THE TIME (ENDTIM) FOR UPDATING THE
C     ENTIRE WIND FIELD IS REACHED.  PARTICLES MAY FALL INTO THE LOCAL
C     CELL FROM ABOVE DURING TRANSPORT.
C
C ************************  GLOSSARY  *********************************
C
C     AX          X COMPONENT OF A WIND VECTOR RETRIEVED FROM A LOCAL
C                 WIND FIELD DESCRIPTION.  METERS/SEC.
C     AY          Y COMPONENT  -  SEE AX
C     AZ          Z COMPONENT  -  SEE AX
C     CRMINX(K)   COORDINATE OF THE WESTERN BOUNDING PLANE FOR THE K-TH
C                 LOCAL CIRCULATION SYSTEM CELL
C     CRMANY(K)   SEE CRMINX(K) - SOUTHERN BOUNDARY
C     CRMAXY(K)   SEE CRMINX(K) - NORTHERN BOUNDARY
C     CRMINY(K)   SEE CRMINX(K) - EASTERN BOUNDARY
C     CRUHT(K)    ALTITUDE (METERS ABOVE MSL) OF THE TOP BOUNDARY OF THE
C                 K-TH LOCAL CIRCULATION CELL
C     DTLOC       TIME STEP DURATION (SECONDS) FOR TRANSPORT WITHIN LOCAL
C                 LOCAL CIRCULATION CELLS
C     ENDTIM      TIME FOR THE NEXT UPDATING OF THE WIND FIELD. SECONDS
C     FV          SETTLING RATE (ABSOLUTE VALUE IN METERS/SEC.) OF THE
C                 J-TH PARTICLE AS COMPUTED BY SUBROUTINE FALRAT
C     IRROR       STATEMENT NEAR THE POINT WHERE AN ERROR WAS DISCOVERED
C     J           INDEX FOR PARTICLE DESCRIPTIONS
C     JW          INDEX OF THE WIND ARRAY STRATA IN THE MACRO WIND FIELD.
C                 THIS INDEX INCREASES FROM BOTTOM TO TOP OF THE FIELD.
C                 IF NEGATIVE AT ENTRANCE, IT IS SET POSITIVE AND USED BY
C                 GETWND.  IF ZERO OR POSITIVE AT ENTRANCE, IT IS RE-
C                 COMPUTED BY GETWND.
C     JWAD        AN INDEX FOR THE STORAGE ARRAYS (ONE DIMENSIONAL) FOR
C                 MACRO WIND FIELD VECTORS.  JWAD IS SET NEGATIVE BY
C                 GETWND IF THE NEEDED MACRO WIND FIELD VECTORS ARE NOT
C                 IN CORE.
C     JWT         TEMPORARY INDEX OF THE BOUNDING BLANE
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C     K          ARGUMENT OF LOTRAN THAT COMMUNICATES THE INDEX OF THE
C                LOCAL SYSTEM CELL IN OR ABOVE WHICH THE J-TH PARTICLE
C                IS LOCATED WHEN LOTRAN IS CALLED
C     NC         A BRANCH POINT VARIABLE FOR USE WITH AN ASSIGNED GO TO
C                NC THAT EFFICIENTLY TRANSFERS TO THE APPROPRIATE LOCAL
C                CIRCULATION SYSTEM PROGRAM DURING EXECUTION OF THE
C                LOCAL TRANSPORT LOOP
C     NCIR       TEMPORARY NON-SUBSCRIPTED STORAGE FOR LOCAL CIRCULATION
C                SYSTEM TYPE NUMBER
C     NCRTYP(K)  TYPE DESIGNATION FOR THE K-TH LOCAL CIRCULATION SYSTEM
C                SEE THE EXPLANATION OF TYPE NUMBERS BELOW.
C                     1              MTWND1
C                     2              RGWND1
C                     3              CBREZ1
C                     4            NOT ASSIGNED
C                     5            NOT ASSIGNED
C     TCELLT     SEE TXX.   FOR THE PLANE DEFINING LOCAL CELL TOP
C     TLAYER     SEE TXX.   FOR THE HORIZONTAL PLANES BOUNDING THE MACRO
C                WIND FIELD LAYER THAT THE PARTICLE IS IN
C     TP(J)      TIME COORDINATE FOR THE J-TH PARTICLE
C                SINCE DETONATION
C     TXX        TIME OF FLIGHT TO NEXT (IN TIME) INTERCEPT BETWEEN
C                PARTICLE TRAJECTORY AND AN X=CONSTANT PLANE BOUNDING
C                THE LOCAL WIND CELL
C     TYY        SEE TXX.   FOR A Y-BOUNDARY PLANE
C     VPZ        VERTICAL PARTICLE VELOCITY, M/SEC.
C     VX( )      X COMPONENT ARRAY OF THE MACRO WIND FIELD DESCRIPTION
C     VY( )      Y COMPONENT - SEE VX( )
C     VZ( )      Z COMPONENT - SEE VX( )
C     XP(J)      X COORDINATE OF THE J-TH PARTICLE.  A COMMON ARRAY
C     XX         X COORDINATE OF THE POINT FOR WHICH GETWND IS TO GET
C                THE APPLICABLE MACRO WIND VECTOR
C     YP(J)      Y COORDINATE OF THE J-TH PARTICLE.  A COMMON ARRAY
C     YY         Y COORDINATE - SEE XX
C     ZP(J)      Z COORDINATE OF THE J-TH PARTICLE.  A COMMON ARRAY
C                ALTITUDE OF J-TH PARTICLE IN METERS ABOVE MSL
C     ZZ         Z COORDINATE - SEE XX
C
C ******************************************************************
C
      COMMON /SET1/
     1        DIAM   , DETID  , IRISE  , IEXEC  , ISIN   , ISOUT   ,
     2        SD     , SPAR   , SSAM   , THE    , TMP1   , TMP2    ,
     3        T2M    , U      , VPR    , W      , X      , Z       ,
     4        WHY    , RMIN   , IDISTR , SPAR1  , SPAR2  , SPAR3   ,
     5        SPAR4  , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9
      DIMENSION  DETID(12),WHY(40)
C
C ******************************************************************
C
      COMMON /SET2/
     1        S      , SUBSID , GRINT  , BXLL   , BXLU   , BYLL
     2,       BYLU   , TXLL   , TXLU   , TYLL   , TYLU   , XGZ
     3,       YGZ    , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM
     4,       KLIM   , II     , JJ     , KK     , XP     , YP
     5,       ZP     , FMAS   , TP     , PS     , VX     , VY
     6,       VZ     , IL     , JL     , IBADD  , WGRINT , NSTRAT
     7,       WLLX   , WLLY   , WURX   , WURY   , BOTHIT   IPARIN
     8,       IOTOPO , IOWIND , INTOPO , IPOUT  , IPAROT , JTOP1
     9,       JWIND1 , IRROR  , YLIMIT , ENDTIM , IC     , IBYPAS
```

```
     1,       JTOPJ  , NLOST  , NG     , NTO    , NTI    , NW
     2,       NALOFT , JTIME1 , NBMAX  , NFREE  , N      , NCL
     3,       CRMAXY , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY
     4,       U0     , SN     , CS     , NLOCIR , DTLOC  , ATEMP
     5,       RHO    , NA     , TGZ    , DYMAC  , FROG   , CRMAXX
     6,       ROPART
      DIMENSION TOPOLM(4,4)    ,NINTAR(4)      ,ITOPLM(3,4)
      DIMENSION S(10,10)       ,SUBSID(400)    ,IC(18)
      DIMENSION XP(200)        ,YP(200)        ,ZP(200)        ,FMAS(200)
      DIMENSION TP(200)        ,PS(200)        ,ATEMP(260)     ,RHO(260)
      DIMENSION VX(1500)       ,VY(1500)       ,VZ(1500)       ,IL(70)
      DIMENSION JL(70)         ,IBADD(70)      ,WURX(70)
      DIMENSION WGRINT(70)                     ,WLLX(70)       ,WLLY(70)
      DIMENSION WURY(70)       ,BOTHIT(70)     ,SN(6)          ,CS(6)
      DIMENSION CRMINX(6)      ,CRMAXX(6)      ,CRMINY(6)      ,CRMAXY(6)
      DIMENSION CRUHT(6)       ,NCRTYP(6)      ,U0(6)
C
C ***********************************************************************
C
      DATA PROGRM/6HLOTRAN/
C
C ***********************************************************************
C ***********************************************************************
C
C     PUT LOCAL CIRCULATION TYPE NUMBER IN TEMPORARY STORAGE
      NCIR=NCRTYP(K)
C     MAKE AN ASSIGNMENT TO ALLOW AN EFFICIENT
C     BRANCH TO THE APPROPRIATE LOCAL CIRCULATION TRANSPORT CODE
C     IN THE ACTUAL LOCAL TRANSPORT LOOP
      GO TO (101,102,103,104,105),NCIR
  101 ASSIGN 121 TO NC
      GO TO 120
  102 ASSIGN 122 TO NC
      GO TO 120
  103 ASSIGN 123 TO NC
      GO TO 120
  104 ASSIGN 124 TO NC
      GO TO 120
  105 ASSIGN 125 TO NC
C
C 120 BEGIN THE LOCAL TRANSPORT LOOP.
C     FIRST DETERMINE IF THE PARTICLE IS BELOW THE LEVEL OF THE TOP
C     OF THE K-TH LOCAL CIRCULATION SYSTEM CELL.  IF IT IS NOT, CALL
C     GETWIND TO GET THE MACRO WIND VECTOR AT PARTICLE POSITION AND THEN
C     MOVE THE PARTICLE BY TRANSFERING TO 130. IF PARTICLE IS WITHIN THE
C     LOCAL CELL, A BRANCH MUST BE MADE TO THE APPROPRIATE SUBROUTINE.
  120 ZZ=ZP(J)
      PSIZE=PS(J)
      CALL FALRAT(ZZ,PSIZE,FV,ATEMP,RHO,FROG,ISOUT)
      IF(ZP(J)-CRUHT(K))1202,1202,1201
C 1201 PARTICLE IS ABOVE LOCAL CELL
 1201 XX = XP(J)
      YY = YP(J)
      ZZ = ZP(J)
      CALL GETWND(XX,YY,ZZ,JWAD,JW)
C     WAS THE MACRO WIND FIELD SPECIFICATION AVAILABLE FOR THE PARTICLE
C     POSITION.  NO TO 1203
      IF(JWAD)1203,1203,1204
C 1203 MACRO WIND FOR THIS PARTICLE IS NOT AVAILABLE.
 1203 IRROR = 1203
```

```
      GO TO 7734
C
C 1204 COMPUTE VERTICAL COMPONENT OF PARTICLE VELOCITY
 1204 VPZ=VZ(JWAD)-FV
C
C     COMPUTE TIMES OF FLIGHT TO ALL BOUNDARY INTERCEPTS THAT ARE IN THE
C     FUTURE.  FIRST COMPUTE TIME TO COMING X BOUNDARY OF LOCAL CELL
      IF(VX(JWAD))1205,1206,1206
 1205 TXX=(XP(J)-CRMINX(K))/VX(JWAD)
      GO TO 1207
 1206 TXX=(CRMAXX(K)-XP(J))/VX(JWAD)
C
C 1207 COMPUTE TIME  TO COMING Y BOUNDARY INTERCEPT
 1207 IF(VY(JWAD))1208,1209,1209
 1208 TYY=(YP(J)-CRMINY(K))/VY(JWAD)
      GO TO 1210
 1209 TYY=(CRMAXY(K)-YP(J))/VY(JWAD)
C
C 1210 COMPUTE TIMES TO COMING Z BOUNDARY (HORIZONTAL) OF MACRO WIND
C     FIELD AND TO THE TOP OF THE LOCAL WIND CELL
 1210 IF(VPZ)1211,1212,1212
 1211 TCELLT=(CRUHT(K)-ZP(J))/VPZ
      JWT=JW
      GO TO 1213
 1212 TCELLT=1.0E+08
      JWT=JW+1
 1213 TLAYER=(BOTHIT(JWT)-ZP(J))/VPZ
C
C      COMPUTE TIME UNTIL TIME FOR UPDATING THE WIND FIELD
      TTIM=ENDTIM-TP(J)
C
C     NOW SELECT THE TIME  UNTIL THE FIRST VALID BOUNDARY INTERCEPT
C     ADD A SMALL INCREMENT TO PUSH THE PARTICLE PAST THE BOUNDARY OF
C     THE LOCAL CELL.
      TTRANS=AMIN1(TXX,TYY,TCELLT,TLAYER,TTIM) +.01
C
C     NOW TRANSPORT THE PARTICLE FOR THAT PERIOD OF TIME
      XP(J)=XP(J)+TTRANS*VX(JWAD)
      YP(J)=YP(J)+TTRANS*VY(JWAD)
      ZP(J)=ZP(J)+TTRANS*VPZ
      TP(J)=TP(J)+TTRANS
      GO TO 131
C
C 1202 PARTICLE IS WITHIN LOCAL CELL.  BRANCH TO CALL APPROPRIATE WIND
C     PROGRAM
C     BRANCH TO CALL A LOCAL WIND PROGRAM TO TEST PARTICLE FOR IMPACT ON
C     TOPOGRAPHY;  IF IMPACTED,IT ASSIGNS A LARGE DOWNWARD WIND COM-
C     PONENT.  IF NOT IMPACTED, IT COMPUTES CORRECT WIND COMPONENTS AT
C     THE PARTICLE POSITION
 1202 GO TO NC,(121,122,123,124,125)
 121  CALL MTWND1(J,K,AX,AY,AZ)
      GO TO 130
 122  CALL RGWND1(J,K,AX,AY,AZ)
      GO TO 130
 123  CALL CBREZ1(J,K,AX,AY,AZ)
      GO TO 130
C *********  CODE INSERTION  POINTS  ************************************
 124  CONTINUE
 125  CONTINUE
C *********  CODE INSERTION  POINTS  ************************************
```

```
 125  IRROR=-126                                                        LOTR 231
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)                                    LOTR 232
C                                                                       LOTR 233
C 130 TRANSPORT THE PARTICLE FOR ONE TIME INCREMENT  (DTLOC).           LOTR 234
 130  ZP(J)=ZP(J)+ DTLOC*(AZ-FV)                                        LOTR 235
      XP(J)=XP(J)+ DTLOC*AX                                             LOTR 236
      YP(J)=YP(J)+ DTLOC*AY                                             LOTR 237
      TP(J)=TP(J)+ DTLOC                                                LOTR 238
C                                                                       LOTR 239
C 131 TEST FOR BOUNDARY CROSSINGS                                       LOTR 240
C     IS PARTICLE AT OR BEYOND THE LOCAL CIRCULATION BOUNDARIES         LOTR 241
C     YES TO 132                                                        LOTR 242
 131  IF(XP(J)-CRMINX(K))132,132,133                                    LOTR 243
 133  IF(CRMAXX(K)-XP(J))132,132,134                                    LOTR 244
 134  IF(YP(J)-CRMINY(K))132,132,135                                    LOTR 245
 135  IF(CRMAXY(K)-YP(J))132,132,137                                    LOTR 246
C 137 TEST TO REMOVE IMPACTED PARTICLES                                 LOTR 247
C     WAS THE PARTICLE BELOW THE ANALYTICAL TOPOGRAPHY WHEN THE LOCAL   LOTR 248
C     WIND WAS COMPUTED.   YES TO 132                                   LOTR 249
 137  IF(AZ-1.0E+08)132,132,136                                         LOTR 250
C                                                                       LOTR 251
C 136 PARTICLE IS STILL WITHIN KTH LOCAL SYSTEM. NOW CHECK TIME BOUNDARYLOTR 252
C     HAS THE PARTICLE BEEN TRANSPORTED UP TO OR BEYOND THE TIME FOR    LOTR 253
C     UPDATING THE WIND FIELD                                           LOTR 254
 136  IF(TP(J)-ENDTIM)120,132,132                                       LOTR 255
C                                                                       LOTR 256
C 132 PARTICLE CANNOT BE MOVED FURTHER BY LOCAL SYSTEM TRANSPORT CODE   LOTR 257
C                                                                       LOTR 258
  132 RETURN                                                            LOTR 259
      END                                                               LOTR 260
$IBFTC MTWNJ    LIST,DECK,M94/2                                         MTWN   0
      SUBROUTINE MTWND1(J,K,AX,AY,AZ)                                   MTWN   1
C     11 OCT 66                                                         MTWN   2
C     I. KOHLBERG, T.W.SCHWENKE  TECHNICAL OPERATIONS RESEARCH, INC.    MTWN   3
C                                                                       MTWN   4
C     THIS SUBROUTINE SERVES THE DUAL PURPOSE OF READING MOUNTAIN WIND  MTWN   5
C     DATA WHEN THE SIGN OF ARGUMENT J IS MINUS) AND COMPUTING THE      MTWN   6
C     MOUNTAIN WIND FOR THE JTH PARTICLE AFTER FIRST CHECKING FOR IMPACTMTWN   7
C     ON THE ANALYTICAL GROUND.  IF IMPACT IS SENSED THE PARTICLE IS    MTWN   8
C     ASSIGNED A LARGE DOWNWARD VELOCITY COMPONENT.                     MTWN   9
C                                                                       MTWN  10
C *********************************************************************MTWN  11
C                                                                       MTWN  12
      COMMON /SET1/                                                     MTWN  13
     1           DIAM    , DETID   , IRISE   , IEXEC   , ISIN    , ISOUT   ,  MTWN  14
     2           SD      , SPAR    , SSAM    , THE     , TMP1    , TMP2    ,  MTWN  15
     3           T2M     , U       , VPR     , W       , X       , Z       ,  MTWN  16
     4           WHY     , RMIN    , IDISTR  , SPAR1   , SPAR2   , SPAR3   ,  MTWN  17
     5           SPAR4   , SPAR5   , SPAR6   , SPAR7   , SPAR8   , SPAR9      MTWN  18
C                                                                       MTWN  19
C *********************************************************************MTWN  20
C                                                                       MTWN  21
      DIMENSION  DETID(12),WHY(40)                                      MTWN  22
      COMMON /SET2/                                                     MTWN  23
     1           S       , SUBSID  , GRINT   , BXLL    , BXLU    , BYLL     MTWN  24
     2,          BYLU    , TXLL    , TXLU    , TYLL    , TYLU    , XGZ      MTWN  25
     3,          YGZ     , NBLCK   , HTOPO   , TTOPO   , ILIM    , JLIM     MTWN  26
     4,          KLIM    , II      , JJ      , KK      , XP      , YP       MTWN  27
     5,          ZP      , FMAS    , TP      , PS      , VX      , VY       MTWN  28
     6,          VZ      , IL      , JL      , IBADD   , WGRINT  , NSTRA1   MTWN  29
```

```
     7,       WLLX   , WLLY   , WURX   , WURY   , BOTHIT , IPARIN
     8,       IOTOPO , IOWIND , IHTOPO , IPOUT  , IPAROT , JTOP1
     9,       JWIND1 , IRROR  , TLIMIT , ENDTIM , IC     , IBYPAS
     1,       JTOPJ  , NLOST  , NG     , NTO    , NTI    , NW
     2,       NALOFT , JTIME1 , NBMAX  , NFREE  , N      , NCL
     3,       CRMAXY , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY
     4,       UO     , SN     , CS     , NLOCIR , DTLOC  , ATEMP
     5,       RHO    , NA     , TGZ    , DTMAC  , FROG   , CRMAXX
     6,       ROPART
      DIMENSION TOPOLM(4,4)    ,NINTAR(4)      ,ITOPLM(3,4)
      DIMENSION S(10,10)       ,SUBSID(400)    ,IC(18)
      DIMENSION XP(200)        ,YP(200)        ,ZP(200)        ,FMA (200)
      DIMENSION TP(200)        ,PS(200)        ,ATEMP(260,     ,RHO(260)
      DIMENSION VX(1500)       ,VY(1500)       ,VZ(1500)       ,IL(70)
      DIMENSION JL(70)         ,IBADD(70)      ,WURX(70)
      DIMENSION WGRINT(70)                     ,WLLX(70)       ,WLLY(70)
      DIMENSION WURY(70)       ,BOTHIT(70)     ,SN(6)          ,CS(6)
      DIMENSION CRMINX(6)      ,CRMAXX(6)      ,CRMINY(6)      ,CRMAXY(6)
      DIMENSION CRUHT(6)       ,NCRTYP(6)      ,UO(6)
C ********************************************************************
C
C     PARAMETERS PECULIAR TO SUBROUTINE MTWND1
C
      DIMENSION XM(12),YM(12),H(12),A(12),A2(12),A2H(12),A3H(12)
C
C*******************MOUNTAIN WIND1 GLOSSARY************************
C
C     A(J)          HALF-WIDTH OF THE J-TH MOUNTAIN
C     AX            WIND VECTOR EAST
C     AY            WIND VECTOR NORTH
C     AZ            VERTICAL WIND VECTOR
C     CN(K)         COSINE OF COUNTER-CLOCKWISE ANGLE FROM EAST OF
C                   UNPERTURBED WIND
C     CRMAXY(K)     NORTH     BOUNDARY OF THE K-TH LOCAL CELL.
C     CRMINY(K)     SOUTH     BOUNDARY OF THE K-TH LOCAL CELL.
C     CRMAXX(K)     EAST      BOUNDARY OF THE K-TH LOCAL CELL.
C     CRMINX(K)     WEST      BOUNDARY OF THE K-TH LOCAL CELL.
C     CRUHT(K)      THE LOCAL CELL TOP HEIGHT  (METERS)
C     DELX
C     DELX          X COORDINATE OF MACROSYSTEM TRANSLATED INTO LOCAL
C                   CELL COORDINATES
C     DELY          Y COORDINATE        SEE DELX
C     DSX           THE X PRIME RESULT OF ROTATION OF (DELX,DELY) INTO
C                   THE K-TH LOCAL COORDINATE SYSTEM.
C     DSY           THE Y PRIME RESULT       SEE DSX
C     DZ            SUM OF TOPO HEIGHT INCREMENTS
C     DZ            MOUNTAIN RATIO OF H(J)/A(J)
C     H(J)          HEIGHT OF THE J-TH MOUNTAIN
CC     NMT          THE NUMBER OF MOUNTAINS REPRESENTED IN THIS MOUNTAIN
C                   WIND SYSTEM
C     SN(K)         SINE OF ANGLE COUNTER-CLOCKWISE FROM EAST OF
C                   UNPERTURBED WIND
C     UO(K)         MAGNITUDE OF UNPERTURBED WIND VECTOR
C     XM(J)         X LOCATION COORDINATE OF THE J-TH MOUNTAIN
C     YM(J)         Y LOCATION COORDINATE OF THE J-TH MOUNTAIN
C     XX            X COORDINATE OF CENTER OF LOCAL CELL
C     YY            Y COORDINATE OF CENTER OF LOCAL CELL
C     ZZ            Z COORDINATE OF CENTER OF LOCAL CELL
C     JW            INDEX OF THE WIND STRATUM CONTAINING THE PARTICLE
C     JWAD          INDEX OF MACRO WIND CELL CONTAINING PARTICLE
```

```
C     XP(J)         PARTICLE POSITION COORDINATE
C     YP(J)         PARTICLE POSITION COORDINATE
C     ZP(J)         PARTICLE POSITION COORDINATE
C
C ***********************************************************************
C
 1     FORMAT(4F10.3)
 2     FORMAT(//25X24HLOCAL CIRCULATION NUMBERI6/30X15HMOUNTAIN WIND 1//1
     15X8HMOUNTAIN4X8HMOUNTAIN4X8HMOUNTAIN4X20HLOCATION COORDINATES/15X6
     2HNUMBER6X6HHEIGHT6X5HWIDTH7X1HX11X1HY)
 3     FORMAT(/12X,I6,6X,4F11.3//)
 4     FORMAT(//25X,36HCOORDINATES OF LOCAL CELL BOUNDARIES/,15X,5HNORTH,
     110X,5HSOUTH,11X,4HEAST,11X,4HWEST,10X,6HHEIGHT//,10X,5F15.3//)
 5     FORMAT(/25X,46HCHARACTERISTICS OF THE UNPERTURBED WIND VECTOR/20X,
     116HUNPERTURBED WIND,4X,17HCOSINE OF ANGULAR,4X,15HSINE OF ANGULAR,
     2/20X,16HVECTOR MAGNITUDE,5X,15HDEV. FROM NORTH,5X,15HDEV. FROM NOR
     3TH//,18X,3F20.5//)
C
C ***********************************************************************
C
      DATA PROGRM/6HMTWND1/
C
C ***********************************************************************
C ***********************************************************************
C
      IF(J)100,101,102
 101  IRROR=-101
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)
C
C 100 THIS IS THE DATA READING ROUTE
 100  J=0
      CRUHT(K)=0.0
 103  J=J+1
      READ (ISIN,1) XM(J),YM(J),H(J),A(J)
      A2(J)=A(J)*A(J)
      A3H(J)=A2(J)*A(J)*H(J)
      IF(J-12)1031,1032,1032
 1032 IRROR=1032
      GO TO 7734
 1031 IF(H(J))1099,104,1099
C1099 COMPUTE THE KTH LOCAL CELL HEIGHT.
 1099 DZ=ABS(3.0*H(J))
      IF (DZ-CRUHT(K))110,110,1100
 1100 CRUHT(K)=DZ
C 110 CHECK TO SEE THAT THE MOUNTAIN JUST READ IS WITHIN THE LIMITS OF
C     THE KTH LOCAL WIND SYSTEM.
  110 IF(XM(J)-CRMINX(K)) 114,111,111
  111 IF(XM(J)-CRMAXX(K)) 112,112,114
  112 IF (YM(J)-CRMINY(K)) 114,113,113
 113  IF (YM(J)-CRMAXY(K)) 115,115,114
C
C 114 THE MOUNTAIN IS NOT WITHIN THE LIMITS OF THE KTH LOCAL WIND SYSTEM
  114 IRROR= 114
      GO TO 7734
C
C 115 CHECK TO SEE THAT THE MOUNTAIN RATIO H(J)/A(J) IS LESS THAN 0.6
 115  DZ = H(J)/A(J)
      IF (DZ-0.6)103,116,116
C
C 116 THE MOUNTAIN RATIO H(J)/A(J) IS NOT LESS THAN  0.6
```

```
  116 IRROR = 116
      GO TO 7734
C
 104  NMT=J-1
C     NMT                  THE NUMBER OF MOUNTAINS REPRESENTED IN THIS
C                          MOUNTAIN WIND SYSTEM
C 1042  COMPUTE UNPERTURBED VECTOR HERE
C     THE FOLLOWING THREE CARDS CONSTITUTE THE LOCATION COORDINATES OF
C     THE UNPERTURBED WIND VECTOR
      YY=(CRMAXY(K)+CRMINY(K))/2.0
      XX=(CRMAXX(K)+CRMINX(K))/2.0
      ZZ=CRUHT(K)/2.0
      CALL GETWND(XX,YY,ZZ,JWAD,JW)
      IF(JWAD)1043,1044,1045
 1043 IRROR=1043
      GO TO 7734
 1044 IRROR=1044
      GO TO 7734
C     THE FOLLOWING THREE CARDS CONSTITUTE THE MAGNITUDE AND DIRECTION
C     OF THE UNPERTURBED WIND VECTOR
 1045 UO(K)=SQRT(VX(JWAD)*VX(JWAD)+VY(JWAD)*VY(JWAD))
      SN(K)=VY(JWAD)/UO(K)
      CS(K)=VX(JWAD)/UO(K)
      DO 1049 J=1,NMT
 1049 A2H(J)=A2(J)*H(J)*UO(K)
      WRITE (ISOUT,2)K
      WRITE (ISOUT,3)(J,H(J),A(J),XM(J),YM(J),J=1,NMT)
      WRITE (ISOUT,4)CRMAXY(K),CRMINY(K),CRMAXX(K),CRMINX(K),CRUHT(K)
      WRITE (ISOUT,5)UO(K),SN(K),CS(K)
 105  RETURN
C
C 102 THIS IS THE TESTING AND COMPUTING ROUTE
C      COMPUTE THE TOPOGRAPHIC INCREMENT AT POSITION OF THE JTH PARTICLE
C     COMPUTE THE PERTURBED WIND COMPONENTS, SUM THEM, AND ADD THEM
C     TO THE UNPERTURBED WIND VECTOR.
 102  AX=0.0
      AY=0.0
      AZ=0.0
      DZ=0.0
      DO 106 I=1,NMT
C     THE FOLLOWING TWO CARDS TRANSLATE THE PARTICLE INTO THE MOUNTAIN
C     COORDINATE SYSTEM.
      DELX=XP(J)-XM(I)
      DELY=YP(J)-YM(I)
C     THE FOLLOWING TWO CARDS ROTATE THE PARTICLE INTO THE MOUNTAIN
C     COORDINATE SYSTEM.
      DSX = DELX * CS(K) + DELY * SN(K)
      DSY =-DELX * SN(K) + DELY * CS(K)
      Y2 = DSY * DSY
      X2 = DSX * DSX
      R2=X2+Y2
C     NOW COMPUTE TOPO HEIGHT INCREMENT RESULTING FROM THE ITH MOUNTAIN
C     AND ADD IT TO SUM.
      DZ = DZ + A3H(I)/((A2(I)+R2)*SQRT(A2(I)+R2))
C
C     COMPUTE PERTURBATION WIND INCREMENTS
      AMBDA = ZP(J)+A(I)
      AMBDA2=AMBDA*AMBDA
      DENOM= (R2+AMBDA2)*(R2+AMBDA2)*SQRT(R2+AMBDA2)
      D= A3H(I)*3.0*DSX/DENOM
```

```
C
C1061   AX, THE PERTURBED WIND COMPONENT IN THE DIRECTION OF THE
C       UNPERTURBED WIND.
 1061 AX=AX+A2H(I)*(Y2+AMBDA2-2.0*X2)/DENOM
C       AY, AZ, THE PERTURBED WIND COMPONENTS PERPENDICULAR TO THE
C       DIRECTION OF THE UNPERTURBED WIND.
        AY= AY - Q*DSY
 106    AZ= AZ - Q*AMBDA
C
C       NOW TEST FOR IMPACTED PARTICLE
        IF(DZ-ZP(J))109,108,108
C 108  PARTICLE HAS IMPACTED
 108    AZ=-1.0E+08
        AX=0.0
        AY=0.0
        GO TO 105
C 109 THE PARTICLE IS ALOFT.  NOW ADD THE UNPERTURBED  WIND VECTOR TO
C       THE PERTURBED COMPONENT IN THE SAME DIRECTION.
 109    DELX = AX+U0(K)
C       THE FOLLOWING TWO CARDS DEROTATE THE WIND VECTOR INTO THE
C       MACRO SYSTEM.
        AX=DELX*CS(K)-AY*SN(K)
        AY=DELX*SN(K)+AY*CS(K)
        GO TO 105
        END
$IBFTC RGWN1    LIST,DECK,M94/2
        SUBROUTINE RGWND1(J,K,AX,AY,AZ)
C       11 OCT 66
C       I. KOHLBERG, T.W.SCHWENKE  TECHNICAL OPERATIONS RESEARCH, INC.
C
C       THIS SUBROUTINE SERVES THE DUAL PURPOSE OF READING RIDGE WIND
C       DATA WHEN THE SIGN OF ARGUMENT J IS MINUS) AND COMPUTING THE
C       RIDGE WIND FOR THE JTH PARTICLE AFTER FIRST CHECKING FOR IMPACT
C       ON THE ANALYTICAL GROUND.  IF IMPACT IS SENSED THE PARTICLE IS
C       ASSIGNED A LARGE DOWNWARD VELOCITY COMPONENT.
C
C ***********************************************************************
C
       COMMON /SET1/
     1          DIAM    , DETID  , IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2          SD      , SPAR   , SSAM   , TME    , TMP1   , TMP2     ,
     3          T2M     , U      , VPR    , W      , X      , Z        ,
     4          WHY     , RMIN   , IDISTR , SPAR1  , SPAR2  , SPAR3    ,
     5          SPAR4   , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9
C
C ***********************************************************************
C
       DIMENSION  DETID(12),WHY(40)
       COMMON /SET2/
     1          S       , SUBSID , GRINT  , BXLL   , BXLU   , BYLL     ,
     2,         BYLU    , TXLL   , TXLU   , TYLL   , TYLU   , XGZ      ,
     3,         YGZ     , NBLCK  , HTOPO  , TTOPO  , ILIM   , JLIM     ,
     4,         KLIM    , II     , JJ     , KK     , XP     , YP       ,
     5,         ZP      , FMAS   , TP     , PS     , VX     , VY       ,
     6,         VZ      , IL     , JL     , IBADD  , WGRINT , NSTRAT   ,
     7,         WLLX    , WLLY   , WURX   , WURY   , BOTHIT , IPARIN   ,
     8,         IOTOPO  , IOWIND , IHTOPO , IPOUT  , IPAROT , JTOP1    ,
     9,         JWIND1  , IRHOR  , TLIMIT , ENDTIM , IC     , IBYPAS   ,
     1,         JTOPJ   , NLOST  , NG     , NTO    , NTI    , NW       ,
     2,         NALOFT  , JTIME1 , NBMAX  , NFREE  , N      , NCL
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     3,       CRMAXY , CRUHT  , NCRTYP , BZ     , CRMINX , CRMINY
     4,       UO     , SN     , CS     , NLOCIR , DTLOC  , ATEMP
     5,       RHO    , NA     , TGZ    , DTMAC  , FROG   , CRMAXX
     6,       ROPART
      DIMENSION TOPOLM(4,4)    ,NINTAR(4)      ,ITOPLM(3,4)
      DIMENSION S(10,10)       ,SUBSID(400)    ,IC(10)
      DIMENSION XP(200)        ,YP(200)        ,ZP(200)        ,FMAS(200)
      DIMENSION TP(200)        ,PS(200)        ,ATEMP(260)     ,RHO(260)
      DIMENSION VX(1500)       ,VY(1500)       ,VZ(1500)       ,IL(70)
      DIMENSION JL(70)         ,IBADD(70)      ,WURX(70)
      DIMENSION WGRINT(70)                     ,WLLX(70)       ,WLLY(70)
      DIMENSION WURY(70)       ,BOTHIT(70)     ,SN(6)          ,CS(6)
      DIMENSION CRMINX(6)      ,CRMAXX(6)      ,CRMINY(6)      ,CRMAXY(6)
      DIMENSION CRUHT(6)       ,NCRTYP(6)      ,UO(6)
C
C ***********************************************************************
C
C     PARAMETERS PECULIAR TO SUBROUTINE RGWND1
C
      DIMENSION XM(12),YM(12),H(12),A(12),B(12),C(12),SG(12),CG(12),
     1A2(12),AH(12),D(12),A2H(12)
C
C*************************RIDGE WIND 1 GLOSSARY************************
C
C     A(K)           THE HALF WIDTH OF THE KTH RIDGE
C     AX             WIND VECTOR EAST
C     AY             WIND VECTOR NORTH
C     AZ             VERTICAL WIND VECTOR
C     AX             PERTURBED WIND COMPONENT IN THE DIRECTION OF THE
C                    UNPERTURBED WIND
C     B(K)           CLOCKWISE ANGULAR DEVIATION OF KTH RIDGE FROM
C                    TRUE NORTH
C     CCG            COSINE OF ANGLE UNPERTURBED WIND MAKES WITH
C                    PERPENDICULAR FROM KTH RIDGE
C     CN(K)          COSINE OF COUNTER-CLOCKWISE ANGLE FROM EAST OF
C                    UNPERTURBED WIND
C     CRMAXY(K)      NORTH     BOUNDARY OF THE K-TH LOCAL CELL.
C     CRMINY(K)      SOUTH     BOUNDARY OF THE K-TH LOCAL CELL.
C     CRMAXX(K)      EAST      BOUNDARY OF THE K-TH LOCAL CELL.
C     CRMINX(K)      WEST      BOUNDARY OF THE K-TH LOCAL CELL.
C     CRUHT(K)       THE LOCAL CELL TOP HEIGHT  (METERS)
C     DSX            THE PERPENDICULAR DISTANCE OF THE JTH PARTICLE FROM
C                    THE ITH RIDGE  (METERS)
C     DZ             SUM OF TOPO HEIGHT INCREMENTS
C     DZ             RIDGE RATIO OF H(J)/A(J)
C     H(K)           THE HEIGHT OF THE KTH RIDGE
C     NRG            NUMBER OF RIDGES IN THIS RIDGE WIND SYSTEM
C     SN(K)          SINE OF ANGLE COUNTER-CLOCKWISE FROM EAST OF
C                    UNPERTURBED WIND
C     SSG            SINE OF ANGLE UNPERTURBED WIND MAKES WITH
C                    PERPENDICULAR FROM KTH RIDGE
C     UO(K)          MAGNITUDE OF UNPERTURBED WIND VECTOR
C     XM(J)          X LOCATION COORDINATE OF THE J-TH RIDGE
C     XX             X COORDINATE OF CENTER OF LOCAL CELL
C     YM(J)          Y LOCATION COORDINATE OF THE J-TH RIDGE
C     YY             Y COORDINATE OF CENTER OF LOCAL CELL
C     ZZ             Z COORDINATE OF CENTER OF LOCAL CELL
C     JW             INDEX OF THE WIND STRATUM CONTAINING THE PARTICLE
C     JMAD           INDEX OF MACRO WIND CELL CONTAINING PARTICLE
C     XP(J)          PARTICLE POSITION COORDINATE
```

```
C     YP(J)         PARTICLE POSITION COORDINATE
C     ZP(J)         PARTICLE POSITION COORDINATE
C
C *****************************************************************
C
 1    FORMAT(5F10.3)
 2    FORMAT(//25X24HLOCAL CIRCULATION NUMBERI6/30X15H  RIDGE  WIND 1//1
     15X5HRIDGE7X5HRIDGE7X5HRIDGE7X20HLOCATION COORDINATES8X13HRIDGE AZI
     2MUTH/15X6HNUMBER6X6HHEIGHT6X5HWIDTH9X1HX11X1HY)
 3    FORMAT(/12X,I6,3X,4F12.3,8X,F11.3//)
 4    FORMAT(//25X,36HCOORDINATES OF LOCAL CELL BOUNDARIES/,15X,5HNORTH,
     110X,5HSOUTH,11X,4HEAST,11X,4HWEST,10X,6HHEIGHT//,7X,5F15.3///)
 5    FORMAT(/25X,46HCHARACTERISTICS OF THE UNPERTURBED WIND VECTOR/20X,
     116HUNPERTURBED WIND,4X,17HCOSINE OF ANGULAR,4X,15HSINE OF ANGULAR,
     2/20X,16HVECTOR MAGNITUDE,5X,15HDEV. FROM NORTH,5X,15HDEV. FROM NOR
     3TH//,13X,3F20.5//)
C
C *****************************************************************
C
      DATA PROGRM/6HRGWND1/
C
C *****************************************************************
C *****************************************************************
C
      IF(J)100,101,102
 101  IRROR=-101
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)
C 100 THIS IS THE DATA READING ROUTE
 100  J=0
      CRUHT(K)=0.0
 103  J=J+1
      READ (ISIN,1) XM(J),YM(J),H(J),A(J),B(J)
      C(J) = COS(B(J))
      D(J) = SIN(B(J))
      A2(J) = A(J)*A(J)
      A2H(J)=A2(J)*H(J)
      IF(J-12)1031,1032,1032
 1032 IRROR=1032
      GO TO 7734
 1031 IF(H(J))1099,104,1099
C1099 COMPUTE THE KTH LOCAL CELL HEIGHT.
 1099 DZ=ABS(3.0*H(J))
      IF (DZ-CRUHT(K))110,110,1100
 1100 CRUHT(K)=DZ
C 110 CHECK TO SEE THAT THE RIDGE JUST READ IS WITHIN THE LIMITS OF
C     THE KTH LOCAL WIND SYSTEM.
  110 IF(XM(J)-CRMINX(K)) 114,111,111
  111 IF(XM(J)-CRMAXX(K)) 112,112,114
  112 IF (YM(J)-CRMINY(K)) 114,113,113
 113  IF (YM(J)-CRMAXY(K)) 115,115,114
C
C 114 THE RIDGE IS NOT WITHIN THE LIMITS OF THE KTH LOCAL WIND SYSTEM
  114 IRROR= 114
      GO TO 7734
C
C 115 CHECK TO SEE THAT THE RIDGE RATIO H(J)/A(J) IS LESS THAN 0.6
 115  DZ = H(J)/A(J)
      IF (DZ-0.6) 103,116,116
C
C 116 THE RIDGE RATIO H(J)/A(J) IS NOT LESS THAN  0.6
```

```
  116 IRROR = 116
      GO TO 7734
C
 104  NRG=J-1
C     NRG                 THE NUMBER OF RIDGES REPRESENTED IN THIS
C                         RIDGE WIND SYSTEM
C 1042  COMPUTE UNPERTURBED VECTOR HERE
C     THE FOLLOWING THREE CARDS CONSTITUTE THE LOCATION COORDINATES OF
C     THE UNPERTURBED WIND VECTOR
      YY=(CRMAXY(K)+CRMINY(K))/2.0
      XX=(CRMAXX(K)+CRMINX(K))/2.0
      ZZ=CRUHT(K)/2.0
      CALL GETWND(XX,YY,ZZ,JWAD,JW)
      IF(JWAD)1043,1044,1045
 1043 IRROR=1043
      GO TO 7734
 1044 IRROR=1044
      GO TO 7734
C     THE FOLLOWING THREE CARDS CONSTITUTE THE MAGNITUDE AND DIRECTION
C     OF THE UNPERTURBED WIND VECTOR
 1045 UO(K)=SQRT(VX(JWAD)*VX(JWAD)+VY(JWAD)*VY(JWAD))
      SN(K)=VY(JWAD)/UO(K)
      CS(K)=VX(JWAD)/UO(K)
      DO 1049 J=1,NRG
      SSG    = CS(K)*D(J)+SN(K)*C(J)
      CCG    = CS(K)*C(J)-SN(K)*D(J)
      AH(J)= -A(J)*H(J)*UO(K)*CCG*CCG
      SG(J)=SSG/CCG
 1049 CG(J)= 2.0/CCG
C
      WRITE (ISOUT,2)K
      WRITE (ISOUT,3)(J,H(J),A(J),XM(J),YM(J),B(J),J=1,NRG)
      WRITE (ISOUT,4)CRMAXY(K),CRMINY(K),CRMAXX(K),CRMINX(K),CRUHT(K)
      WRITE (ISOUT,5)UO(K),SN(K),CS(K)
 105  RETURN
C
C 102 THIS IS THE TESTING AND COMPUTING ROUTE
C      COMPUTE THE TOPOGRAPHIC INCREMENT AT POSITION OF THE JTH PARTICLE
C     COMPUTE THE PERTURBED WIND COMPONENTS, SUM THEM, AND ADD THEM
C     TO THE UNPERTURBED WIND VECTOR.
 102  AX=0.0
      AY=0.0
      AZ=0.0
      DZ=0.0
      DO 106 I=1,NRG
C107  THIS CARD TRANSLATES AND ROTATES THE PARTICLE INTO THE RIDGE
C     WIND SYSTEM.  DSX IS THE PERPENDICULAR DISTANCE OF THE J-TH
C     PARTICLE FROM THE I-TH RIDGE.
 107  DSX = (XP(J)-XM(I))*C(I)-(YP(J)-YM(I))*D(I)
      X2 = DSX*DSX
      AMBDA = ZP(J) +A(I)
      AMBDA2 = AMBDA*AMBDA
C     NOW COMPUTE TOPO HEIGHT INCREMENT RESULTING FROM THE ITH RIDGE
C     AND ADD IT TO SUM.
      DZ= DZ + A2H(I)/(A2(I)+X2)
C
C     THE FOLLOWING CARDS COMPUTE THE PERTURBATION WIND INCREMENTS
      AHCD= AH(I)/((X2+AMBDA2)*(X2+AMBDA2))
      AMBDA2= X2-AMBDA2
C     AX  IS THE COMPONENT IN THE DIRECTION OF THE UNPERTURBED WIND
```

```
      AX=AHCD*AMRDA2 + AX                                               RGWN 215
      AY= AHCD*SG(I)*AMBDA2 + AY                                        RGWN 216
 106  AZ= AHCD*CG(I)*AMBDA*DSX + AZ                                     RGWN 217
C                                                                       RGWN 218
C     NOW TEST FOR IMPACTED PARTICLE                                    RGWN 219
      IF(DZ-ZP(J))109,108,108                                           RGWN 220
C 108  PARTICLE HAS IMPACTED                                            RGWN 221
 108  AZ=-1.0E+08                                                       RGWN 222
      AX=0.0                                                            RGWN 223
      AY=0.0                                                            RGWN 224
      GO TO 105                                                         RGWN 225
C 109 THE PARTICLE IS ALOFT.  NOW ADD THE UNPERTURBED  WIND VECTOR TO   RGWN 226
C     THE PERTURBED COMPONENT IN THE SAME DIRECTION.                    RGWN 227
 109  DSX=AX+UO(K)                                                      RGWN 228
C     THE FOLLOWING TWO CARDS DEROTATE THE WIND SYSTEM INTO MACRO FIELD RGWN 229
C     COORDINATES                                                       RGWN 230
      AX= DSX*CS(K)-AY*SN(K)                                            RGWN 231
      AY= DSX*SN(K)+AY*CS(K)                                            RGWN 232
      GO TO 105                                                         RGWN 233
      END                                                               RGWN 234
      GO TO 105                                                         RGWN 233
$IBFTC BAT1     LIST,DECK,M94/2                                         BAT1   0
      SUBROUTINE BATMAN                                                 BAT1   1
C     VERSION 1                                                         BAT1   2
C     R C TOMPKINS -- US ARMY NUCLEAR DEFENSE LABS                      BAT1   3
C     AUGUST 1966                                                       BAT1   4
C   THIS VERSION REPLACES SURROUTINES INGEN, BATMAN, DECAY, AND DOSE OF BAT1   5
C   THE INITIAL VERSION OF DELFIC                                       BAT1   6
C                                                                       BAT1   7
C                                                                       BAT1   8
C   THE FUNCTION OF THIS SUBROUTINE IS TO COMPUTE RADIOACTIVE DECAY     BAT1   9
C   CHAINS BY MEANS OF THE BATEMAN EQUATION                             BAT1  10
CALLED BY FRATIO, GXPSR, AND MCHDEP                                     BAT1  11
C                                                                       BAT1  12
C  *  *  *  *  *  *  *  *  *  *  *  GLOSSARY  *  *  *  *  *  *  *  *  * BAT1  13
C   ABEGN(700)      INITIAL FISSION PRODUCT ABUNDANCES IN ATOMS/10000   BAT1  14
C                   FISSIONS (PARALLEL TO NUCLID)                       BAT1  15
C   ABUNDO(700)     FISSION PRODUCT ABUNDANCES PER 10000 FISSIONS       BAT1  16
C                   ATOMS AT TMSD IN FRATIO                             BAT1  17
C                   DISINTEGRATIONS/SEC AT TIME (JD=1)                  BAT1  18
C                 , DISINTEGRATIONS FROM TENTER TO TEXIT                BAT1  19
C                   OR INFINITY (JD=2)                                  BAT1  20
C   B(15)           CONTRIBUTION OF ONE SUBCHAIN TO ABUNDO              BAT1  21
C   CNIJ(680)       BATEMAN COEFFICIENTS FOR ONE SUBCHAIN               BAT1  22
C   IBR             COUNTER TO KEEP PLACE IN BRANCHING RATIO TABLE WHILE BAT1  23
C                   SCANNING NUCLIDE TABLE                              BAT1  24
C   IFIGO           ASSIGNED GOTO PARAMETER CORRESPONDING TO IGO        BAT1  25
C   IFJD            ASSIGNED GOTO PARAMETER CORRESPONDING TO JD         BAT1  26
C   IGO             (LOGICAL) TRUE GIVES ACTIVITY,                      BAT1  27
C                   FALSE GIVES ATOMIC ABUNDANCES                       BAT1  28
C   INFORM(11)      TABLE OF DAUGHTER RETRIEVAL INFORMATION FOR EACH    BAT1  29
C                   MEMBER OF A SUBCHAIN, OBTAINED BY TRUNCATING NUCLID BAT1  30
C                   FROM THE LEFT                                       BAT1  31
C   JD              (LOGICAL) TRUE COMPUTES EXPOSURE RATE,              BAT1  32
C                   FALSE COMPUTES DOSE                                 BAT1  33
C   KDOS            (LOGICAL) TRUE COMPUTES DOSE FROM TENTER TO TEXIT,  BAT1  34
C                   FALS  COMPUTES DOSE FROM TENTER TO INFINITY         BAT1  35
C   KFJD            SEE IFJD                                            BAT1  36
C   LIM(11)         SUBCHAIN TABLE OF INDICES FOR MULT TO FIND CURRENT  BAT1  37
C                   BRANCHING PATH                                      BAT1  38
```

```
C    LSUB            COUNTER FOR SUBCHAIN MEMBERS
C    NUC(11)         CROSS REFERENCE OF SUBCHAIN MEMBERS TO INDEX IN NUCLID
C    SBR(11)         SUBCHAIN BRANCHING RATIOS
C    SCA(15)         FISSION YIELDS OF SUBCHAIN MEMBERS
C    SDC(15)         DISINTEGRATION CONSTANTS OF SUBCHAIN MEMBERS
C    TENTER          ENTRY TIME (SEC) FOR DOSE CALCULATION WITH JD = FALSE
C    TEXIT           EXIT TIME (SEC) FOR DOSE CALCULATION
C                    WITH JD = FALSE, KDOS = TRUE
C    TIME            TIME (SEC) AT WHICH EXPOSURE RATE OR MASS CHAIN
C                    DEPOSITE IS CALCULATED WITH JD = TRUE
C
C
      COMMON/OUTPUT/
     1     FISNUM       ,FP     (200) ,FH            ,ITAB        ,JGO
     2    ,MASCHN       ,SIGMAS
      COMMON/UTILTY/
     1     KOUT         ,NPRNT (15)
C
      COMMON/INDUCE/
     1     ALBFOM       ,FAC   (7,18),FOGRNY(7,18),ISO    (18)
     2    ,LMAX         ,XLAM  (7,18)
C
      COMMON/FISHIN/
     1     ABEGN (700) ,ABUNDO(700) ,BRANCH(130) ,CAPFIS
     2    ,DCON  (700) ,IBRA        ,INUC        ,MAXNUC
     3    ,MULT  (11)  ,NUCLID(700)
C
      COMMON/DECAY/
     1     IGO          ,JD           ,KDOS         ,TENTER
     2    ,TEXIT        ,TIME
C
      COMMON/FRYLNG/
     1     BSUBK (90)  ,ERM    (185) ,JRM    (185) ,KRM     ,ECF(90)
C
      COMMON/SET 3/DUMMY(3753)
C
      DIMENSION  EFAC  (11)  ,KBR    (11)
     1           ,INFORM(11)  ,LIN    (11)  ,NUC    (11)  ,SBR    (11)
     2           ,SCA    (11)  ,SDC    (11)
C
      LOGICAL JD,KDOS,IGO,FLAG,NPRNT
C
CC  SET INITIAL VALUES
      DO 1 I = 1,INUC
    1 ABUNDO(I) = 0.0
      IBR = 0
C
CC  BEGIN MAIN LOOP THROUGH THE NUCLIDE TABLE
C
   10 DO 500 IN = 1,INUC
C   FIND THE NEXT NUCLIDE THAT BEGINS A SUBCHAIN
      IF (NUCLID(IN))11,500,499
C
C   SET PARAMETERS FOR BEGINNING OF A SUBCHAIN
C         MEMBERSHIP COUNTER
   11 LSUB = 1
C         BRANCHING RATIO COUNTER
      LBR = IBR
      KBR(1) = LBR
C         STARTING INDEX
```

```
      NUC(1) = IN
   12 LIM(LSUB) = 4
C   PROCESS A SUBCHAIN MEMBER
   13 KP = NUC(LSUB)
      IM = LIM(LSUB)
      INFO = MOD(IABS(NUCLID(KP)),MULT(5))
      INFORM(LSUB) = INFO
      INC = 1
C   SET UP SUBCHAIN DISINTEGRATION CONSTANTS
      SDC(LSUB) = DCON(KP)
CHECK FOR END OF SUBCHAIN
      IF (INFO.EQ.4) GO TO 21
CHECK FOR BRANCHING
      IF (MOD(INFO,MULT(1)).LT.4) GO TO 14
      SBR(LSUB) = 1.0
      GO TO 15
C   SET UP SUBCHAIN BRANCHING RATIOS
   14 LB = LBR + 5 - IM
      SBR(LSUB) = BRANCH(LB)
C   EXTRACT THE DAUGHTER INCREMENT
   15 ID = MOD(INFO,MULT(IM+1))/MULT(IM)
C   SEE IF THIS INCREMENT SHOULD BE NEGATIVE
      IF (MOD(INFO,MULT(2))/MULT(1).EQ.IM)GO TO 16
C   SET PARAMETER TO LOOK AHEAD FOR BRANCHING RATIO OF DAUGHTER
      KI = KP
      GO TO 17
C   SET PARAMETER TO LOOK BEHIND FOR BRANCHING RATIO OF DAUGHTER
   16 KI = 1
      LBR = 0
      INC = -INC
COMPUTE DAUGHTER INDEX
   17 NDAUT = KP + INC*ID
      KDA = NDAUT - 1
C   STEP THROUGH THE NUCLIDE TABLE TO ESTABLISH THE CORRECT INDEX FOR
C   THE BRANCHING RATIO OF THE DAUGHTER
      DO  20 K = KI,KDA
   20 LBR = LBR + 4 - (IABS(MOD(NUCLID(K),MULT(1))))
      KBR(LSUB+1) = LBR
C
C   ACCEPT THE DAUGHTER FOR MEMBERSHIP IN THE SUBCHAIN AND RECYCLE
      LSUB = LSUB + 1
      IF (LSUB.GT.11) GO TO 1301
      NUC(LSUB) = NDAUT
      GO TO 12
C
CC  A SUBCHAIN HAS NOW BEEN SET UP AND CAN BE STUDIED IN TOTO
C   ELIMINATE  UNI-MEMBERED SUBCHAIN
   21 IF (LSUB.EQ.1) GO TO 500
C   RUN BACK THROUGH THE SUBCHAIN TO ACCUMULATE BRANCHING RATIOS
      ASSIGN 23 TO LGO
      JL = 0
      SCA(LSUB) = 1.0
      LAST = LSUB + 1
      DO 22 L = 2,LSUB
      LBACK = LAST - L
      SCA(LBACK) = 1.0
      GO TO LGO,(22,23)
C   FIND THE LAST BRANCH IN THE SUBCHAIN
   23 IM = LIM(LBACK)
      IF (MOD(INFORM(LBACK),MULT(IM))/MULT(IM-1))22,22,24
```

```
   24 JL = LBACK
      ASSIGN 22 TO LGO
   22 SCA(LBACK) = SBR(LBACK)*SCA(LBACK+1)
      SCA(LSUB) = 0.0
CORRECT FISSION YIELDS FOR BRANCHING
      FLAG = .FALSE.
      DO 25 J = 1,LSUB
      JN = NUC(J)
      SCA(J) = SCA(J)*ABEGN(JN)
      IF (FLAG) GO TO 25
C   MAKE A NOTE IF AT LEAST ONE VALUE OF SCA IS NONTRIVIAL
      IF (SCA(J))25,25,27
   27 FLAG = .TRUE.
   25 CONTINUE
C
C   OMIT COMPUTATIONS FOR TRIVIAL SUBCHAIN
      IF (.NOT.FLAG) GO TO 30
C
CC  THE CENTRAL COMPUTATIONS BEGIN AT THIS POINT
C
      DO 200 N = 1,LSUB
COMPUTE EXPONENTIALS BEFORE ENTERING INNER  LOOPS
      IF (JD) TENTER = TIME
      EFAC(N) = EXP(-SDC(N)*TENTER)
      IF (KDOS) EFAC(N) = EFAC(N) - EXP(-SDC(N)*TEXIT)
      B = 0.0
C
      DO 150 I = 1,N
      DO 150 K = I,N
C
COMPUTE BATEMAN COEFFICIENTS
      CNIJ = 1.0
      DO 106 L = I,N
      IF (N.GT.L) CNIJ = CNIJ*SDC(L)
      IF (L.EQ.K) GO TO 106
      FACTC = SDC(L) - SDC(K)
      IF (ABS(FACTC).LT.1.E-15) FACTC = SIGN(1.E-15,FACTC)
      CNIJ = CNIJ/FACTC
  106 CONTINUE
COMPUTE BATEMAN EQUATION, BRANCH TO 109 FOR INTEGRATED FORM
C
      Q = CNIJ*SCA(I)*EFAC(K)
      IF (JD) GO TO 150
C   PREVENT DIVIDE CHECK ERROR
      IF (SDC(K))150,150,110
  110 Q = Q/SDC(K)
  150 B = B + Q
C   STORE RESULTS IN ABUNDANCE TABLE
      IF (B)200,200,151
  151 IF (IGO) B = B*SDC(N)
      NK = NUC(N)
      ABUNDO(NK) = ABUNDO(NK) + B
  200 CONTINUE
C
C   SET UP A NEW SUBCHAIN STARTING FROM DEEPEST UNEXPLORED BRANCH
   30 IF (JL)500,499,31
   31 LSUB = JL
      LIN(LSUB) = LIN(LSUB) + 1
      LBR = KBR(LSUB)
      GO TO 13
```

```
C
C
 1301         WRITE (KOUT,1351) ' 'CLID(IN)
C
C   STEP UP BRANCH COUNTER IN MAIN LOOP
  499 IBR = IBR + 4 - MOD(IABS(NUCLID(IN)),MULT(1))
  500 CONTINUE
      IF (NPRNT(9)) WRITE (KOUT,1000) (NUCLID(I),ABUNDO(I),I=1,INUC)
      RETURN
 1000 FORMAT (17H1OUTPUT OF BATMAN//8X6HNUCLID11X6HABUNDO/
     1     (5X012,5X1PE12.4))
 1351 FORMAT (25H0SUBCHAIN BEGINNING WITH 012,8H TOO BIG)
      END
$IBFTC TIMSEX  LIST,DECK,M94/2
C     FTIMSEC - 3/66 - TOMPKINS
C
      FUNCTION TIMSEC (TIME,IUNIT,IEXP)
C
      GO TO (1,2,3,4,5),IUNIT
C
    1 SCALE = 1.0
      GO TO 6
    2 SCALE = 60.0
      GO TO 6
    3 SCALE = 3.6E3
      GO TO 6
    4 SCALE = 8.64E4
      GO TO 6
    5 SCALE = 8.64E4*365.25
C
    6 TIMSEC = TIME*SCALE*10.**IEXP
      RETURN
      END
$IBFTC UNPAX   LIST,DECK,M94/2
C     SRUNPACK - 3/66 - MEREDITH
C
      SUBROUTINE UNPACK
     1    (IA,IZ,IS,NAME)
C
      JX = 8
      JY = 4096
C
      IA = NAME/JY
      IZ = (NAME - IA*JY)/JX
      IS =  MOD (NAME,JX)
C
   10 RETURN
      END
   10 RETURN
$IBFTC LNK8    LIST,DECK,M94/2
      SUBROUTINE LINK8
C     T.W.SCHWENKE   TECHNICAL OPERATIONS RESEARCH   OUTPUT PROCESSOR  I
C     15 FEB 67
C     FIRST HALF OF THE OUTPUT PROCESSOR
C     THIS PROGRAM INITIALIZES AND WRITES HEADINGS FOR THE OUTPUT
C     PROCESSOR.  THEN IT CALLS THE FIRST PART OF THE PARTICLE ACTIVITY
C     MODULE (PAM1) TO PRECOMPUTE DATA USED BY THE SECOND PART OF THE
C     PARTICLE ACTIVITY MODULE WHICH WILL BE CALLED DURING THE
C     EXECUTION OF LINK9.
C
```

```
C ************************************************************* ******LNK8
C                                                                     LNK8
C                                                                     LNK8
      COMMON/OUTPUT/                                                  LNK8
     1    FISNUM      ,FP    (200) ,FW           ,ITAB       ,JGO     LNK8
     2   ,MASCHN      ,SIGMAS                                         LNK8
      COMMON /SET1/                                                   LNK8
     1          DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISUUT  , LNK8
     2          SD     , SPAR   , SSAM   , TME    , TMP1   , TMP2   , LNK8
     3          T2M    , U      , VPR    , W      , HBURST , SCLDHB , LNK8
     4          TID(40), RMIN   , IDISTR , SPAR1  , HBTAPE , SPAR3  , LNK8
     5          SPAR4  , SUBRAD , RADMAX , XGZ    , YGZ    , TGZ      LNK8
      COMMON   /SET3/                                                 LNK8
     1    BZ            ,BZ2            ,BZZ            ,BZ22         LNK8
     2   ,DELTAX        ,DGX            ,DGY            ,DIFCON       LNK8
     3   ,DIFADJ        ,FMAS(500)      ,FMASS(200)     ,IC(18)       LNK8
     4   ,ICON          ,ICTR           ,IH             ,IOT(18)      LNK8
     5   ,IP            ,IPOUT          ,ITT(18)        ,IV           LNK8
     6   ,JC(18)        ,JIN            ,JOUT           ,JPOUT        LNK8
     7   ,KTR(500)      ,KTAPE          ,LAST           ,MAPRUN       LNK8
     8   ,MARRAY        ,MIN            ,MXREQ                        LNK8
     9   ,N             ,NA             ,NBZX           ,NBZX2        LNK8
     1   ,NBZY          ,NCL            ,NE             ,NF           LNK8
     2   ,NIJ           ,NMAP           ,NMAX           ,NOX          LNK8
     3   ,NP(21)        ,NREQ           ,NS             ,NTAPES       LNK8
     4   ,NTAPET        ,NTASK          ,NXMAP          ,NYMAP        LNK8
     5   ,YMIN          ,PS(500)        ,PSIZE(200)     ,PACT(200)    LNK8
     6   ,ROPART                        ,T(500)         ,T1           LNK8
     7   ,T2            ,TLIMIT         ,X(500)         ,XF           LNK8
     8   ,XO            ,XMAX           ,XMIN           ,XNMAP        LNK8
     9   ,X1            ,X2             ,X3             ,X4           LNK8
     1   ,Y(500)        ,YF             ,YO             ,YMAX         LNK8
C                                                                     LNK8
C     DIMENSIONS PECULIAR TO LINK8                                    LNK8
      DIMENSION         CRID(12)      ,OPID(12)      ,PSEID(12)       LNK8
     1   ,TOPID(12)     ,WID(12)                                      LNK8
C                                                                     LNK8
C*********************************** GLOSSARY ***************************LNK8
C                                                                     LNK8
C     DIFCON            ATMOSPHERIC DIFFUSION CONSTANT                LNK8
C     DIFADJ            ADJUSTMENT FACTOR TO ALLOW FOR DIFFUSIVE GROWTH LNK8
C                       OF CLOUD SUBDIVISIONS.                        LNK8
C     GRUFF IS A GROUND ROUGHNESS FACTOR                              LNK8
C     OPID( )           OUTPUT PROCESSOR IDENTIFICATION               LNK8
C     WID( )            WIND FIELD IDENTIFICATION                     LNK8
C     TOPID( )          TOPOGRAPHY IDENTIFICATION                     LNK8
C     BZ                WIDTH OF CLOUD WAFER AS FIRST READ            LNK8
C     BZ2 = BZ/2 IS THE WIDTH OF THE BUFFER ZONE BETWEEN MAP ZONES.   LNK8
C     BZ22              SQUARE OF HALF THE CLOUD SUBDIVISION LENGTH   LNK8
C     DELTAX            MAP ZONE WIDTH EXCLUSIVE OF BUFFER ZONES      LNK8
C     DGX, DGY - LENGTHS OF GRID INTERVALS IN X AND Y DIRECTIONS      LNK8
C          RESPECTIVELY                                               LNK8
C     HTST,DTST,POUT    TEMPORARY STORAGE                             LNK8
C     IC(J)             OVERALL CONTROL VARIABLES                     LNK8
C     IC(17)  POSITIVE MEANS STOP WITHOUT ENTERING OUTPUT PROCESSOR   LNK8
C     IC(17) = 0 MEANS PROCEED WITH JOB                               LNK8
C     IC(18) POSITIVE MEANS PRINT TAPE IPOUT BEFORE EXECUTION         LNK8
C     IC(18) = 0 MEANS DO NOT PRINT TAPE IPOUT                        LNK8
C     IPOUT = JPOUT = TAPE ON WHICH PARTICLE PARAMETERS ARE WRITTEN BY LNK8
C          THE TRANSPORT PROGRAM.                                     LNK8
```

```
C       ISOUT                SYSTEM OUTPUT TAPE NUMBER                          LNK8  71
C       ISIN                 SYSTEM INPUT TAPE NUMBER                           LNK8  72
C       IOT(J)               ID NUMBERS OF AVAILABLE TAPE UNITS                 LNK8  73
C       ITT(J)               ID NUMBERS OF AVAILABLE TAPE UNITS                 LNK8  74
C       IERRCR               ERROR STOP TRACE WORD                              LNK8  75
C       IH,IV                HORIZONTAL AND VERTICAL CHARACTER SPACINGS FOR     LNK8  76
C                            THE PRINTER IN TERMS OF CHARACTERS PER INCH        LNK8  77
C       ICON                 A ROUTE CONTROL PARAMETER                          LNK8  78
C       ISTP                 A CONTROL PARAMETER                                LNK8  79
C       JC(J)                LOCAL CONTROL VARIABLES                            LNK8  80
C       JC(1) ... OUTPUT FORMAT CONTROL VARIABLE                                LNK8  81
C       =1    2 LINE F FORMAT PRINTER MAP                                       LNK8  82
C       =2    2 LINE F11.3 FORMAT PRINTER MAP                                   LNK8  83
C       JC(15)               IF POSITIVE CAUSES THE USE OF AN ATMOSPHERIC       LNK8  84
C                            DIFFUSION MODEL                                    LNK8  85
C       JC(16) = 0 .... ADJUST GRID INTERVALS TO YIELD AN UNDISTORTED MAP       LNK8  86
C            HAVING A MINIMUM SCALE FACTOR BASED ON DGX OR DGY.                 LNK8  87
C       JC(18) = 0 .....    ADJUSTMENT OF GRID INTERVALS PERMITTED              LNK8  88
C       JC(18) = 1 .....    NO ADJUSTMENT OF GRID INTERVALS PERMITTED           LNK8  89
C       JB,NI                TEMPORARY STORAGE                                  LNK8  90
C       LAST                 =1 INDICATES A SUBSEQUENT SORT IS REQUIRED         LNK8  91
C       MIN                  NUMBER OF CLASSES USED FOR PARTICLE SORT           LNK8  92
C       MARRAY = MAXIMUM NUMBER OF WAFERS THAT CAN BE CONSIDERED AT ONE         LNK8  93
C            TIME                                                               LNK8  94
C       MAPRUN = 0    ...     MAP CALLED FOR FIRST TIME                         LNK8  95
C       MAPRUN = +N   ...     MAP HAS PREVIOUSLY PRINTED N STRIPS OF A MAP      LNK8  96
C       MXREQ                MAXIMUM NUMBER OF PROCESSING REQUEST TYPES         LNK8  97
C                            ALLOWED FOR IN THE CODE                            LNK8  98
C       NZ                   NUMBER OF MAP ZONES RIGHT OF 1ST MAP               LNK8  99
C       NMAP, XNMAP = NUMBER OF OUTPUT GRID POINTS ON ENTIRE MAP                LNK8 100
C       NMAX = MAXIMUM NUMBER OF WAFERS THAT SHOULD BE WRITTEN IN ONE           LNK8 101
C            BLOCK ON THE TAPE CONTAINING WAFERS THAT HAVE YET TO BE            LNK8 102
C            SORTED.                                                            LNK8 103
C       NXMAP = NUMBER OF GRID POINTS IN X DIRECTION IN THE CORE-LOAD MAP       LNK8 104
C            COUNTING 2 BUFFER ZONES                                            LNK8 105
C       NOL                  SMALLEST X INDEX OF A MAP POINT TO THE RIGHT OF    LNK8 106
C                            THE LEFT BOUNDARY OF THE CLOUD SUBDIVISION         LNK8 107
C       NOX = NUMBER OF GRID POINTS IN X DIRECTION IN THE CORE-LOAD MAP         LNK8 108
C            WITHOUT BUFFER ZONES.                                              LNK8 109
C       NYMAP = NUMBER OF GRID POINTS IN Y DIRECTION IN THE CORE-LOAD MAP       LNK8 110
C       NBZX = NUMBER OF GRID POINTS IN X DIRECTION OF WAFER                    LNK8 111
C       NBZX2 = NBZX/2 = NUMBER OF GRID POINTS IN X DIRECTION OF THE            LNK8 112
C            BUFFER ZONE.                                                       LNK8 113
C       NTASK                A SEQUENTIAL COUNTER FOR SPECIFICATIONS OF MAP     LNK8 114
C                            COORDINATES AND GRID INTERVALS                     LNK8 115
C       NCL                  NUMBER OF PARTICLE CLASSES                         LNK8 116
C       NTAPES               THE NUMBER OF AVAILABLE TAPE UNITS                 LNK8 117
C       NTAPET               THE NUMBER OF AVAILABLE TAPE UNITS                 LNK8 118
C       NIJ                  NUMBER OF PARTICLE DESCRIPTIONS IN THE CURRENT     LNK8 119
C                            PARTICLE BLOCK                                     LNK8 120
C       NST                  TEMPORARY STORAGE OF A DATA BLOCK COUNT            LNK8 121
C       NREQ                 COMPUTATION TYPE CODE                              LNK8 122
C       NRQ                  A COUNTER FOR MAP REQUESTS                         LNK8 123
C       NOX                  THE NUMBER OF GRID INTERVALS IN DELTAX             LNK8 124
C       OMAP(J)              THE MAP ARRAY                                      LNK8 125
C       OX                   THE FLOATING EQUIVALENT OF NOX                     LNK8 126
C       T1,T2                REQUEST TIME ARGUMENT                              LNK8 127
C       X,Y,T,PS,ID          PARTICLE DESCRIPTION VARIABLES (INDEXED)           LNK8 128
C       XMAX,XMIN            MAXIMUM AND MINIMUM X COORDINATES OF THE MAP       LNK8 129
C       XO,YO,XF,YF          LIMITING MAP COORDINATES TAKING INTO ACCOUNT       LNK8 130
```

```
C                         T E BOUNDARY BUFFER ZONES
C     YMAX,YMIN           MAXIMUM AND MINIMUM Y COORDINATES OF THE MAP
C
C
C ****************************************************************************
C
 1    FORMAT(12A6)
 2    FORMAT(15X,18I4)
 3    FORMAT(//36H PLEASE REPLACE THE REEL ON LOGICAL I3,19H WITH A BLAN
     1K TAPE                   /////1HC)
 5    FORMAT(A6,I3,5E12.5)
 6    FORMAT(29H0 WRONG TAPE REEL ON DRIVE   I2)
 7    FORMAT(46H0PLEASE MOUNT THE CORRECT TAPE AND PRESS START)
 8    FORMAT(1X71H
     1                 )
 9    FORMAT(6F10.3)
 10   FORMAT(////29X,63H****  SUMMARY OF INPUT IDENTIFIERS AND INITIAL C
     1ONDITIONS  ****///25X43H****  OUTPUT PROCESSOR IDENTIFICATION  ***
     2*/25X,12A6///25X,56H****  INITIAL CONDITIONS (FIREBALL) IDENTIFICA
     3TION  ****/25X,12A6///25X,37H****  CLOUD RISE IDENTIFICATION  ****
     4/25X,12A6///25X,49H****  PARTICLE SET EXPANSION IDENTIFICATION  **
     5**,     /25X,12A6///25X,36H****  TRANSPORT IDENTIFICATION  ****/25
     6X,12A6//25X31H****  WIND IDENTIFICATION  ****/25X,12A6///25X,37H**
     7**  TOPOGRAPHY IDENTIFICATION  ****/25X,12A6)
 11   FORMAT(//15X24HTRANSPORT IDENTIFICATION//25X,12A6)
 12   FORMAT(//25X,24H****  OTHER INPUTS  ****)
 15   FORMAT(18I4)
 13   FORMAT(/15X,26HTHE DIFFUSION CONSTANT IS F12.5)
 16   FORMAT(/15X77H****  THE CONTROL VARIABLE ARRAY, IC(J), WAS GIVEN T
     1HE FOLLOWING VALUES  ****)
 19   FORMAT(//15X54HTHE FOLLOWING LOGICAL TAPES ARE AVAILABLE FOR SORTI
     1NG.)
 21   FORMAT(//15X43HPRINTER DESCRIPTION  -  CHARACTERS PER INCH)
 22   FORMAT(18X,10HHORIZONTALI5,10X,10HVERTICAL  I3)
 26   FORMAT(15X1HX,19X1HY,19X1HT,18X2HPS,19X4HMASS)
 28   FORMAT(1H1///51X19H* * * * * * * * * *//12X101HT H E   D E P A R T
     1 M E N T   O F   D E F E N S E   F A L L O U T   P R E D I C T I O
     2 N   S Y S T E M,//51X,19H* * * * * * * * * *////48X,23HOUTPUT PRO
     3CESSOR MODULE///55X,11HPREPARED BY/43X,34HTECHNICAL OPERATIONS RES
     4EARCH,INC./52X,17HBURLINGTON, MASS.)
 29   FORMAT(////45X29HLISTING OF GROUNDED PARTICLES)
 30   FORMAT(//10X6HBLOCK I4)
 35   FORMAT(I5)
 36   FORMAT(5F20.4)
 37   FORMAT(36H0NO. OF PARTICLES IN THIS BLOCK IS  I4)
 39   FORMAT(33H NO XEQ. THIS JOB, JUST TAPE DUMP)
C
C************************ BEGINNING OF PROGRAM ******************************
C ****************************************************************************
C
      LOGICAL SKIP
      DATA PROGRM /6H LINK8/
      DATA HTST/6HIPOUT /
      KOUT=ISOUT
      DIFADJ=3.0
      IPOUT=9
      JPOUT=IPOUT
      MBTAPE = 11
      MXREQ=20
      MARRAY=500
```

```
      NMAX=300
      NMAP=4000
      XNMAP=NMAP
      NTASK=0
C     CHECK IDENTIFICATION OF IPOUT
 102  REWIND IPOUT
      READ (IPOUT)POUT
      IF (HTST.EQ.POUT) GO TO 101
 100  PRINT 6,IPOUT
      WRITE (ISOUT,6)IPOUT
      WRITE (ISOUT,7)
      PRINT 7
      PAUSE
      GO TO 102
 101  READ(IPOUT)FW,SSAM,SLDTMP,TMSD,SIGMA,TW,HOB,NCL,TLIMIT,BZ,ROPART,
     1 XGZ,YGZ,TGZ,RADMAX
      SIGMAS = SIGMA * SIGMA * 0.5
C
C     PRECOMPUTATION FOR DIFFUSION MODEL
      SUBRAD=BZ/2.0-RADMAX
      RADMAX=RADMAX**2
C
C     READ PREVIOUS IDENTIFIERS FROM GROUNDED PARTICLES TAPE
      READ (IPOUT) (DETID(J),J=1,12),(CRID(J),J=1,12),(PSEID (J),J=1,12)
     1,(TID(J),J=1,12),(WID(J),J=1,12)
      READ (IPOUT)NPS
      READ(IPOUT)(PSIZE(J),FMASS(J),PACT(J),SV,J=1,NPS)
      ITAB = NPS
      READ (IPOUT)(TOPID(J),J=1,12)
C
C     READ IDENTIFIER FOR OUTPUT PROCESSOR RUN
      READ (ISIN,1)(OPID(J),J=1,12)
C
C
C     READ LIST OF AVAILABLE TAPES
      READ (ISIN,15)(IOT(J),J=1,18)
C     TEST TO REMOVE OTHER PROGRAM TAPES
      NTAPES=18
      DO 103 J=1,18
      IF(IOT(J))108,105,106
 106  IF(IOT(J)-IPOUT)107,108,107
 107  IF(IOT(J)-ISOUT)109,108,109
 109  IF(IOT(J)-ISIN)103,115,103
 115  IF (IOT(J)-MBTAPE) 103,108,103
 108  IOT(J)=0
 105  NTAPES=NTAPES-1
 103  ITT(J) = 0
      NTAPET=NTAPES
      IF (NTAPES.EQ.0) GO TO 110
C
C     NOW CONSOLIDATE IN THE ARRAY
      JB=1+NTAPES
      DO 104 J=1,NTAPES
      IF(IOT(J))104,111,104
 111  IF(IOT(JB))112,112,113
 113  IOT(J)=IOT(JB)
      JB=JB+1
      GO TO 104
 112  JB=JB+1
      GO TO 111
```

```
  104  ITT(J)=IOT(J)
C
C      READ CONTROL VARIABLE ARRAY
  110  READ (ISIN,15)(IC(J),J=1,18)
C
       READ (ISIN,9)DIFCON
C      THIS PART OF THE CODE DUMPS TAPE IPOUT IF REQUIRED
C      IC(18) POSITIVE MEANS DUMP TAPE IPOUT BEFORE EXECUTION
       SKIP = .TRUE.
C      IC(18) = 0 MEANS DO NOT DUMP TAPE IPOUT
       IF(IC(18)) 500,5021,502
  500  IRROR=-500
       GO TO 333
  502  SKIP=.FALSE.
       WRITE (ISOUT,28)
       WRITE (ISOUT,29)
       WRITE (ISOUT,11)(TID(J),J=1,12)
 5021  NST = 0
  600  READ (IPOUT)NIJ
       NST=NST+1
       IF(NIJ) 503,501,504
  503  IRROR=-503
       GO TO 333
  504  READ (IPOUT)(X(I),Y(I),T(I),PS(I),FMAS(I),I=1,NIJ)
       IF(SKIP) GO TO 600
       WRITE (ISOUT,30)NST
       WRITE (ISOUT,37)NIJ
       WRITE (ISOUT,26)
       WRITE (ISOUT,36)(X(I),Y(I),T(I),PS(I),FMAS(I),I=1,NIJ)
       GO TO 600
  501  CONTINUE
C      IC(17)  POSITIVE MEANS STOP WITHOUT ENTERING OUTPUT PROCESSOR
C      IC(17) = 0 MEANS PROCEED WITH JOB
  505  IF(IC(17)) 506,511,510
  506  IRROR=-506
  333  CALL ERROR (PROGRM,IRROR,ISOUT)
  510  WRITE (ISOUT,39)
       STOP
C      END OF TAPE IPOUT DUMP
C
  511  CONTINUE
C
C      READ PRINTER DESCRIPTION - CHAR/INCH HORIZONTAL,VERTICAL
 5111  READ (ISIN,15)IH,IV
C      PRINT A HEADING TO IDENTIFY PRINTED OUTPUT
       WRITE (ISOUT,26)
       WRITE (ISOUT,10) (OPID(J),J=1,12),(DETID(J),J=1,12),(CRID(J),J=1,1
      12),(PSEID(J),J=1,12),(TID(J),J=1,12),(WID(J),J=1,12),(TOPID(J),J=1
      2,12)
       WRITE (ISOUT,12)
       WRITE (ISOUT,16)
       WRITE (ISOUT,2)(IC(J),J=1,18)
       WRITE (ISOUT,19)
       WRITE (ISOUT,2)(IOT(J),J=1,18)
       WRITE (ISOUT,21)
       WRITE (ISOUT,22)IH,IV
       WRITE (ISOUT,13)DIFCON
C
C      PERFORM PRECOMPUTATION FOR DIFFUSION MODEL
       DIFCON=3.0*DIFCON
```

```
C
      CALL PAM1
     1    (HOB     ,SLDTMP ,TMSD    ,TW
     2    ,ISIN    ,ISOUT  ,IPOUT   ,SIGMA )
  117 RETURN
      END
$IBFTC PAM1ST  LIST,DECK,M94/2
      SUBROUTINE PAM1
     1    (HOB     ,SLDTMP ,TMSD    ,TW
     2    ,ISIN    ,ISOUT  ,IPOUT   ,SIGMA )
C
C     R C TOMPKINS -- US ARMY NUCLEAR DEFENSE LABS
C     OCTOBER 1966
C
C   EXECUTIVE PROGRAM FOR TIME-INDEPENDENT PART OF PARTICLE-ACTIVITY
C   MODULE
CALLED BY LINK8
CALLS SETUP, YIELD, XPRM, INDCD1, AND FRATIO
C
C  * * * * * * * * * * * * * * * GLOSSARY * * * * * * * * *
C
C   CAPFIS         CAPTURE-TO-FISSION RATIO
C   EMITN          NUMBER OF NEUTRONS EMITTED PER FISSION
C   FISSID         SIX CHARACTER IDENTIFIER OF FISSION TYPE
C   IFTAPE(10)     LOGICAL ARRAY TO CONTROL FILE MANIPULATION
C                  (1) TRUE - SET INTP NOT EQUAL TO ISIN
C                      FALSE - SET INTP = ISIN
C                  (2) TRUE - SET KRD = INTP
C                      FALSE - SET KRD = ISIN
C                  (3) TRUE - WRITE FILE IPAM
C                  (4) TRUE - READ FILE IPAM INTO MEMORY AND RETURN
C                  (5-10) SPARES
C   IPAM           BINARY FILE OF PAM1 OUTPUT FOR RESTARTS
C   ISIN           INPUT FILE (BCD) USED BY OTHER DELFIC MODULES
C   KOUT           BCD FILE OF PAM OUTPUT FOR PERIPHERAL PRINTING
C   KRD            INPUT FILE (BCD) CONTAINING SOIL PARAMETERS
C   NPRNT(20)      LOGICAL ARRAY TO CONTROL WRITING OF KOUT, TRUE = WRITE
C                  (1)  SETUP - TRANSITION CARDS (WARNING - PRODUCES SOME
C                            700 PAGES)
C                  (2)  SETUP - INTERMEDIATE FORM OF NUCLIDE TABLE (OCTAL
C                  (3)  SETUP - FINAL FORM OF NUCLIDE TABLE (OCTAL)
C                  (4)  YIELD - FISSION YIELD TABLE
C                  (5)  XPRM - EXPOSURE RATE MULTIPLIERS
C                  (6)  FRATIO - REFRACTORY FRACTIONS (FR)
C                  (7)  FRATIO - SQUARE ROOT OF FR (BSUBK)
C                  (8)  INDCD1 - INFORMATION STORED FOR USE BY INDCD2
C                  (9)  BATMAN - NUCLIDE ABUNDANCES (WARNING - THIS
C                      OPTION COMBINED WITH JD = FALSE WILL BURY YOU
C                      IN PAPER)
C                  (10) GYPSR - FISSION PRODUCT ACTIVITY VS PART SIZE
C                      (WARNING - SEE (9))
C                  (11) INDCD2 - INDUCED ACTIVITY (SOIL) VS PART SIZE
C                      (WARNING - SEE (9))
C                  (12) URAN - INDUCED ACTIVITY (MASS 239) VS PART SIZE
C                      (WARNING - SEE (9))
C                  (13) MCHDEP - SELECTED MASS CHAIN ACTIVIY VS PART SIZE
C                  (14) SPARE
C                  (15) PAM2 - TOTAL ACTIVITY VS PART SIZE (WARNING-SEE 9
C                  (16-20) SPARES
C   PAMID(12)      RUN IDENTIFICATION FOR PARTICLE-ACTIVITY MODULE
```

```
C  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *
C
      COMMON/FISHIN/
     1     ABEGN (700) ,ABUNDO(700) ,BRANCH(130) ,CAPFIS
     2    ,DCON  (700) ,IBRA        ,INUC        ,MAXNUC
     3    ,MULT  (1 )  ,NUCLID(700)
      COMMON/INDUCE/
     1     ALBFOM       ,FAC   (7,18),FOGRNY(7,18),ISL    (18)
     2    ,LMAX         ,XLAM  (7,18)
      COMMON/UTILTY/
     1     KOUT         ,NPRNT (15)
      COMMON/FRYLNG/
     1     BSUBK (90)   ,ERM   (165) ,JRM    (165) ,KRM    ,ECF(90)
      COMMON/OUTPUT/
     1     FISNUM       ,FP    (200) ,FW          ,ITAB        ,JGO
     2    ,MASCHN       ,SIGMAS
      DIMENSION
     1     PAMID (12)
      LOGICAL
     1     NPRNT        ,IFTAPE(10)
C
C***********************************************************************
C
    1 FORMAT (12A6/10L1/20L1)
    2 FORMAT (2F10.3/A6)
    3 FORMAT (1H1///51X19H* * * * * * * * * *//12X101HT H E   D E P A R
     1T M E N T   O F   D E F E N S E   F A L L O U T   P R E D I C T I
     2O N   S Y S T E M//51X19H* * * * * * * * * *////3X24HPARTICLE ACT
     3IVITY MODULE///55X11HPREPARED BY/43X34HUS ARMY NUCLEAR DEFENSE LAB
     4ORATORY/47X26HEDGEWOOD ARSENAL, MARYLAND////24X12A6)
    4 FORMAT (////48X23HCONTROL VARIABLE ARRAYS//48X9HIFTAPE(I)/30X10L5/
     1//48X8HNPRNT(I)/20X15L5)
    5 FORMAT (////40X31HCAPTURE - TO - FISSION RATIO IS,F10.3)
    6 FORMAT (//35X41HNUMBER OF NEUTRONS EMITTED PER FISSION IS,F10.3)
    7 FORMAT (//47X19HTYPE OF FISSION IS A6)
    8 FORMAT (//20X55HTHE CLOUD REACHED THE SOIL CONDENSATION TEMPERATUR
     1E OF F7.1,4H AT F8.2,5H SEC.)
    9 FORMAT (//42X14HTOTAL YIELD IS,1PE12.4,10H KILOTONS.)
   10 FORMAT (//41X16HFISSION YIELD IS,1PE12.4,10H KILOTONS.)
   11 FORMAT (//32X9HTHERE ARE,I4,36H PARTICLE CLASSES WITH SIGMA OF,
     1     F7.4,1H.)
   12 FORMAT (//41X22HTHE HEIGHT OF BURST IS,F9.3,6H FEET.)
C
C***********************************************************************
C***********************************************************************
C
      KOUT = ISOUT
      IPAM = IPOUT
      INTP = ISIN
      KRD = ISIN
      READ (ISIN,1)
     1     (PAMID(I),I=1,12),(IFTAPE(J),J=1,10),(NPRNT(K),K=1,15)
      IF(IFTAPE(4)) GO TO 150
      READ (ISIN,2)
     1     CAPFIS,EMITN,FISSID
   25 WRITE (KOUT,3)
     1     (PAMID(I),I=1,12)
      WRITE (KOUT,4)
     1     (IFTAPE(J),J=1,10),(NPRNT(K),K=1,15)
      WRITE (KOUT, 9) TW
```

```
      WRITE (KOUT,10) FW
      WRITE (KOUT,7) FISSID
      WRITE (KOUT,12) HOB
      WRITE (KOUT,5) CAPFIS
      WRITE (KOUT,6) EMITN
      WRITE (KOUT,8) SLDTMP,TMSD
      WRITE (KOUT,11) ITAB,SIGMA
      IF(IFTAPE(4)) RETURN
      IF(IFTAPE(1).AND. ISIN.EQ.5)INTP=12
      IF(IFTAPE(1).AND. ISIN.NE.5)INTP=5
      IF(IFTAPE(2)) KRD=INTP
   50 CALL SETUP
     1     (INTP    ,MAXMUL)
      CALL YIELD
     1     (INTP,FISSID)
      CALL XPRM
     1     (INTP)
      CALL INDCD1
     1     (EMITN  ,HOB     ,KRD     ,TW       )
      IF (EMITN.LE.0.0) LMAX=0
      CALL FRATIO
     1     (SLDTMP ,TMSD    ,MCHN    )
      IF (IFTAPE(3)) GO TO 100
      REWIND IPAM
      RETURN
  100 WRITE (IPAM)
     1       CAPFIS,ALBFOM,LMAX,EMITN,FISSID
      WRITE (IPAM)
     1     INUC,IBRA,MAXMUL,KRM,MCHN
      WRITE (IPAM)
     1     (MULT(I),I=1,MAXMUL)
      WRITE (IPAM)
     1     (NUCLID(J),DCON(J),ABEGN(J),J=1,INUC)
      WRITE (IPAM)
     1     (BRANCH(K),K=1,IBRA)
      WRITE (IPAM)
     1     (ERM(L),JRM(L),L=1,KRM)
      WRITE (IPAM)
     1     (BSUBK(M),ECF(M),M=1,MCHN)
      WRITE (IPAM)
     1    ((FAC(I,J),FOGRNY(I,J),XLAM(I,J),I=1,7),ISO(J),J=1,18)
      ENDFILE IPAM
      REWIND IPAM
      RETURN
  150 READ (IPAM)
     1       CAPFIS,ALBFOM,LMAX,EMITN,FISSID
      READ (IPAM)
     1     INUC,IBRA,MAXMUL,KRM,MCHN
      READ (IPAM)
     1     (MULT(I),I=1,MAXMUL)
      READ (IPAM)
     1     (NUCLID(J),DCON(J),ABEGN(J),J=1,INUC)
      READ (IPAM)
     1     (BRANCH(K),K=1,IBRA)
      READ (IPAM)
     1     (ERM(L),JRM(L),L=1,KRM)
      READ (IPAM)
     1     (BSUBK(M),ECF(M),M=1,MCHN)
      READ (IPAM)
     1    ((FAC(I,J),FOGRNY(I,J),XLAM(I,J),I=1,7),ISO(J),J=1,18)
```

```
      REWIND IPAM
      GO TO 25
      END
$IBFTC SUP1     LIST,DECK,M94/2
      SUBROUTINE SETUP
     1    (INTP,MAXMUL)
C     VERSION 1
C
C     R C TOMPKINS -- US ARMY NUCLEAR DEFENSE LABS
C
CALLED BY PAM1
C
C  * * * * * * * * * * * GLOSSARY * * * * * * * * * * * *
C
C   BRANCH(150)    TABLE OF BRANCHING RATIOS THAT LIE BETWEEN 0 AND 1,
C                  I.E., REPRESENT NONTRIVIAL BRANCHES.  IT IS ORDERED
C                  PRIMARILY BY INCREASING VALUES OF NUCLID AND SECON-
C                  DARILY BY DAUGHTER POSITION WITHIN NUCLID.
C   BRAT           TEMPORARY STORAGE FOR BRANCHING RATIO READ FROM INPUT
C                  RECORD
C   BRSUM          SUM OF BRANCHING RATIOS FOR A SINGLE PARENT
C   BRTEST         TOLERANCE FOR COMPARISON OF BRSUM WITH UNITY
C   DATNO          (INTEGER) TEMPORARY STORAGE FOR ATOMIC NUMBER OF
C                  DAUGHTER READ FROM INPUT RECORD
C   DCON(700)      TABLE OF DISINTEGATION CONSTANTS PARALLEL TO NUCLID,
C                  SET TO ZERO FOR STABLE NUCLIDES.  (SEC**-1)
C   DISOM          (INTEGER) TEMPORARY STORAGE FOR ISOMERIC STATE OF
C                  DAUGHTER READ FROM INPUT RECORD.  0 FOR GROUND STATE,
C                  1 AND 2 FOR EXCITED STATES.
C   DMASS          (INTEGER) TEMPORARY STORAGE FOR MASS NUMBER OF
C                  DAUGHTER READ FROM INPUT RECORD
C   HLIFE          FRACTIONAL PART OF HALF-LIFE READ FROM INPUT RECORD
C   IBRA           NUMBER OF ENTRIES IN ARRAY BRANCH
C   IBRAT          ASSIGNED GOTO PARAMETER FOR EXISTENCE OF BRANCHING ON
C                  RECORD BEING PROCESSED
C   IEXP           CHARACTERISTIC OF HALF-LIFE READ FROM INPUT RECORD
C   IM             WORD POSITION INDICATOR FOR LOCATING DAUGHTERS IN
C                  PACKED WORD, USED AS INDEX OF ARRAY MULT.
C   IND            INDEX OF INSERTION POINT IN ARRAY NUCLID FOR NEW ENTRY
C   INPUT          NAMELIST NAME FOR PRINTOUT OF INPUT RECORD
C   INTP           INPUT FILE NUMBER, NORMALLY CORRESPONDS TO SYSIN1
C   INUC           NUMBER OF ENTRIES IN ARRAYS NUCLID AND DCON
C   IUNIT          UNIT OF HALF-LIFE READ FROM INPUT RECORD
C                    1 - SECONDS
C                    2 - MINUTES
C                    3 - HOURS
C                    4 - DAYS
C                    5 - YEARS
C   IS1ST          ASSIGNED GOTO PARAMETER FOR SPECIAL HANDLING OF FIRST
C                  INPUT RECORD
C   ISTOP          ASSIGNED GOTO PARAMETER TO SIGNAL A DISABLING ERROR
C                  FOR PANIC EXIT AFTER PROCESSING
C   ITRUNC         TEMPORARY STORAGE FOR RIGHT-MOST 5 OCTAL POSITIONS OF
C                  NUCLID
C   JBRAT          ASSIGNED GOTO PARAMETER SIMILAR TO IBRAT
C   K2ND           ASSIGNED GOTO PARAMETER FOR ACTION TO BE TAKEN IF
C                  FIRST SEARCH FOR DAUGHTER FAILS
C   K3RD           ASSIGNED GOTO PARAMETER FOR ACTION TO BE TAKEN IF
C                  SECOND SEARCH FOR DAUGHTER FAILS
C   KBR            COUNTER FOR ARRAY BRANCH DURING SCANS OF ARRAY NUCLID
```

```
C    KEND             DO-TERMINATOR FOR DAUGHTER SEARCH
C    KOUT             OUTPUT FILE NUMBER, NORMALLY CORRESPONDS TO SYSOU1
C    KST              DO-INITIATOR FOR DAUGHTER SEARCH
C    KTYP             INDICATOR FOR TYPE OF NUCLEAR TRANSITION ON CURRENT
C                     INPUT RECORD
C    LAMBDA           (REAL) TEMPORARY STORAGE FOR DISINTEGRATION CONSTANT
C                     OF CURRENT INPUT PARENT.  (SEC**-1)
C    MAXBRA           DIMENSION OF ARRAY BRANCH
C    MAXMUL           DIMENSION OF ARRAY MULT, MUST NOT EXCEED 11 ON IBM7094
C    MAXNUC           DIMENSION OF ARRAYS NUCLID AND DCON
C    MAXPNT           DIMENSION OF ARRAY NPRNT
C    MULT(11)         MULTIPLIERS FOR ACCESS TO OCTAL POSITIONS OF WORD,
C                     MULT(I) = 8**I
C    NAMDAU           PACKED NAME OF DAUGHTER NUCLIDE
C    NAMPAR           PACKED NAME OF PARENT NUCLIDE
C    NPRNT(20)        LOGICAL ARRAY TO CONTROL PRODUCTION OF OUTPUT RECORDS
C    NTIMES           COUNTER FOR ITERATIONS OF DAUGHTER SEARCH
C    NUCLID(700)      MASTER TABLE OF NUCLIDES.  THE LEFT-MOST 7 OCTAL POSI-
C                     TIONS CONTAIN THE MASS NUMBER AND ATOMIC NUMBER IN
C                     ASCENDING ORDER AND THE ISOMER NUMBER IN DESCENDING
C                     ORDER.  THE 5 RIGHT-MOST POSITIONS CONTAIN DAUGHTER
C                     IDENTIFICATION.  THE DIGIT POSITION CONTAINS THE IN-
C                     DEX REQUIRED ON MULT TO ACCESS THE LEFT-MOST VACANT
C                     POSITION.  INITIALLY THE MULT(2) TO MULT(4) POSITIONS
C                     ARE OCCUPIED BY KTYP VALUES.  FINALLY THEY CONTAIN THE
C                     INCREMENTS OF THE NUCLID INDEX REQUIRED TO FIND THE
C                     DAUGHTERS.  IF ONE OF THESE IS A DECREMENT, ITS POSI-
C                     TION IS TAGGED IN POSITION MULT(1).  INITIALLY ALL
C                     ENTRIES ARE SET NEGATIVE, BUT AT THE END A MINUS SIGN
C                     DESIGNATES THE BEGINNING OF A SUBCHAIN.
C    PATNO            (INTEGER) TEMPORARY STORAGE FOR THE ATOMIC NUMBER OF
C                     PARENT READ FROM INPUT RECORD
C    PISOM            (INTEGER) TEMPORARY STORAGE OF ISOMERIC STATE OF
C                     PARENT READ FROM INPUT RECORD.  SEE DISOM.
C    PMASS            (INTEGER) TEMPORARY STORAGE FOR THE MASS NUMBER OF
C                     PARENT READ FROM INPUT RECORD
C
C  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *
C
      COMMON/FISHIN/
     1     ABEGN (700) ,ABUNDO(700) ,BRANCH(130) ,CAPFIS
     2    ,DCON  (700) ,IBRA        ,INUC         ,MAXNUC
     3    ,MULT  (11)  ,NUCLID(700)
C
      COMMON/UTILTY/
     1     KOUT         ,NPRNT (15)
C
      INTEGER DATNO,DISOM,DMASS,PATNO,PISOM,PMASS
      LOGICAL NPRNT,FIRST
      REAL LAMBDA
C
      NAMELIST /INPUT/
     1     PMASS,PATNO,PISOM,HLIFE,IEXP,IUNIT,DMASS,DATNO,DISOM,BRAT
C
 1001 FORMAT (29H1INTERMEDIATE OUTPUT OF SETUP//)
 1002 FORMAT (6X4HINUC7X6HNUCLID11X4HDCON/)
 1003 FORMAT (6XI3,5XO12,5X1PE10.3)
 1004 FORMAT (22H1FINAL OUTPUT OF SETUP//)
 1005 FORMAT (///6X4HIBRA5X6HBRANCH/)
 1006 FORMAT (6XI3,5XF8.5)
```

```
C
CC  INITIALIZE VARIABLES
C                    NUCLIDE COUNTER
      INUC = 0
C                    BRANCHING RATIO COUNTER
      IBRA = 0
C                    TOLERANCE ON SUM OF BRANCHING RATIOS
      BRTEST = 0.0001
      ASSIGN 23  TO IS1ST
      ASSIGN 300 TO ISTOP
      ASSIGN 1212 TO ISFULL
      MAXBRA = 130
      MAXMUL = 11
      MAXNUC = 700
      TOL = 1.E-15
C
C
CC  INITIALIZE ARRAYS
      DO 1 I = 1,MAXNUC
      NUCLID(I) = 0
    1 DCON(I) = 0.0
      DO 2 J = 1,MAXBRA
    2 BRANCH(J) = 0.0
C   SET UP WORD-POSITION MULTIPLIERS
      MULT(1) = 8
      DO 3 K=2,MAXMUL
    3 MULT(K) = MULT(1)*MULT(K-1)
C
C   READ AN INPUT RECORD AFTER CHECK OF AVAILABLE SPACE
C
   10 IF (INUC.EQ.MAXNUC) ASSIGN 1308 TO ISFULL
      READ (INTP,11)
     1    PMASS,PISOM,PATNO,HLIFE,IUNIT,IEXP,BRAT,DMASS,DISOM,DATNO
   11 FORMAT
     1    (10X3I3,8XF9.4,1X2I3,3XF7.5,7X3I3)
C
      IF (NPRNT(1)) WRITE (KOUT,INPUT)
CHECK FOR END-OF-FILE SENTINEL
      IF (PMASS)1301,200,12
   12 GO TO ISFULL,(1212,1308)
C
C   RESET PARAMETERS FOR NEW RECORD
C
 1212 LAMBDA = 0.0
      KTYP = 0
      ASSIGN 10 TO IBRAT
      ASSIGN 10 TO JBRAT
      IM = 4
CHECK FOR EXISTENCE OF DAUGHTER
      IF (DMASS)1301,22,13
C
CHECK THE HALF-LIFE
   13 IF (HLIFE)1301,1301,14
   14 LAMBDA = 0.693147/TIMSEC(HLIFE,IUNIT,IEXP)
CHECK THE BRANCHING RATIO AND MARK THE EXISTENCE OF A BRANCH
      IF (BRAT-1.0)15,16,1301
C
   15 ASSIGN 112 TO IBRAT
      ASSIGN 133 TO JBRAT
CC  DETERMINE THE TYPE OF TRANSITION
```

```
C
C          BETA EMISSION
   16 IF (DATNO.EQ.(PATNO+1).AND.DMASS.EQ.PMASS) GO TO 17
C          ISOMERIC TRANSITION
      IF (DATNO.EQ.PATNO.AND.DMASS.EQ.PMASS) GO TO 18
C          NEUTRON PLUS BETA EMISSION
      IF (DATNO.EQ.(PATNO+1).AND.DMASS.EQ.(PMASS-1)) GO TO 19
C          POSITRON EMISSION OR ELECTRON CAPTURE
      IF (DATNO.EQ.(PATNO-1).AND.DMASS.EQ.PMASS) GO TO 20
C          NEUTRON EMISSION
      IF (DATNO.EQ.PATNO.AND.DMASS.EQ.(PMASS-1)) GO TO 21
C    ERROR TRACE FOR ILLEGAL TRANSITION
      GO TO 1301
C
C    INDICATE THE TYPE OF TRANSITION
   17 KTYP = DISOM + 1
      GO TO 22
   18 KTYP = DISOM + 3
      GO TO 22
   19 KTYP = 6
      GO TO 22
   20 KTYP = 7
      GO TO 22
C
C  * *  *  *  *  *  *  *  *  CODE INSERTION POINTS  *  *  *  *  *  *  *
   21 GO TO 1301
C  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *
C
C    PACK THE PARENT NAME INTO THE 7 LOWEST OCTAL POSITIONS OF NAMPAR
   22 NAMPAR = PMASS*MULT(4) + PATNO*MULT(1)
C    IF THIS IS THE FIRST RECORD GO DIRECTLY TO 111 AFTER CHECKING IT OFF
      GO TO IS1ST,(23,100)
   23 ASSIGN 100 TO IS1ST
      GO TO 111
C
C    FIND OUT WHERE THE NEW ENTRY BELONGS IN THE NUCLIDE TABLE WHILE
C    KEEPING TRACK OF LOCATION IN THE BRANCHING RATIO TABLE
  100 KBR = 0
      DO 110 I = 1,INUC
      IND = I
      NUCTRY = IABS(NUCLID(I))
C    INCREMENT THE INDEX OF BRANCH IF REQUIRED
      KBR = KBR + 4 - MOD(NUCTRY,MULT(1))
      IF(NAMPAR/MULT(1)-NUCTRY/MULT(6))131,121,110
  110 CONTINUE
C
C    THE NEW ENTRY BELONGS NEXT IN SEQUENCE.  INCREMENT THE NUCLIDE
COUNTER AND PUT NAME IN HIGH ORDER POSITIONS OF NEW WORD.
  111 INUC = INUC + 1
      NUCLID(INUC) = -((NAMPAR + PISOM)*MULT(5) + KTYP*MULT(4) + 4)
      DCON(INUC) = LAMBDA
      GO TO IBRAT,(10,112)
C
C    ADD NEW BRANCHING RATIO
  112 IBRA = IBRA + 1
      BRANCH(IBRA) = BRAT
C    DECREMENT THE BRANCH INDICATOR
      NUCLID(INUC) = NUCLID(INUC) + 1
      GO TO 10
C
```

```
C   THE NEW ENTRY IS EQUAL TO OR ISOMERIC WITH AN OLD ONE.  ISOMERS MUST
C   BE ORDERED IN D*E*S*C*E*N*D*I*N*G SEQUENCE
  121 IF (IABS(NUCLID(IND))/MULT(5) - (NAMPAR + PISOM))131,141,122
C   IF THIS IS THE END OF THE TABLE WE MUST STOP HERE AND GO TO 111
 122  IF (IND.EQ.INUC) GO TO 111
      IND = IND + 1
      IF (IABS(NUCLID(IND))/MULT(6).GT.NAMPAR/MULT(1)) GO TO 131
      KBR = KBR + 4 - MOD(IABS(NUCLID(IND)),MULT(1))
      GO TO 121
C
C   THE NEW ENTRY MUST BE I*N*S*E*R*T*E*D ABOVE IND.  MOVE THE
C   SUCCEEDING ENTRIES DOWN TO MAKE ROOM.
  131 INUC = INUC + 1
      JST = IND + 1
      JS = JST + INUC
      DO 140 J = JST,INUC
      JJ = JS - J
      NUCLID(JJ) = NUCLID(JJ-1)
  140 DCON(JJ) = DCON(JJ-1)
C
C   NOW INSERT THE NEW ENTRY
  132 NUCLID(IND) = -((NAMPAR + PISOM)*MULT(5) + KTYP*MULT(4) + 4)
      DCON(IND) = LAMBDA
      GO TO JBRAT,(10,133)
C
C   DECREMENT THE BRANCH INDICATOR
  133 NUCLID(IND) = NUCLID(IND) + 1
CHECK POSITION IN BRANCHING RATIO TABLE, AND GO TO 134 IF INSERTION IS
C   REQUIRED.
  134 IF (KBR.LT.IBRA) GO TO 135
C   OTHERWISE EXTEND THE TABLE.
      IBRA = IBRA + 1
      BRANCH(IBRA) = BRAT
      GO TO 10
C
  135 IBRA = IBRA + 1
C   MAKE ROOM IN THE TABLE.
      KST = KBR + 1
      KS = KST + IBRA
      DO 136 K = KST,IBRA
      KK = KS - K
  136 BRANCH(KK) = BRANCH(KK-1)
      BRANCH(KBR) = BRAT
      GO TO 10
C
C   THE NEW ENTRY REPRESENTS ANOTHER BRANCH OF AN OLD ENTRY.
C   SET POSITION INDICATOR.
  141 IM = MOD(IABS(NUCLID(IND)),MULT(1))
      NDAUT = 4 - IM
CHECK FOR DUPLICATION
      IF (NDAUT + KTYP)1302,1303,142
  142 INDICT = MOD(IABS(NUCLID(IND)),MULT(5))
      DO 150 L = 1,NDAUT
      LM = 5 - L
      IF (INDICT/MULT(LM).EQ.KTYP) GO TO 1303
  150 CONTINUE
C
CHECK AGREEMENT OF DISINTEGRATION CONSTANTS
      IF (LAMBDA.NE.DCON(IND)) GO TO 1304
C   ENTER THE NEW TRANSITION AND DECREMENT THE POSITION COUNTER.
```

```
      NUCLID(IND) = NUCLID(IND) - KTYP*MULT(IM) + 1
C     GO BACK TO STORE THE BRANCHING RATIO
      GO TO 134
C
C
CC    NOW THAT ALL THE INPUT RECORDS HAVE BEEN READ, IT IS TIME TO SET UP
CC    THE RELATIONS BETWEEN THE PARENT AND DAUGHTER INDICES.
C
C
C     WRITE INTERMEDIATE OUTPUT IF REQUESTED
  200 IF(.NOT.NPRNT(2)) GO TO 2000
      WRITE (KOUT,1001)
      WRITE (KOUT,1002)
      WRITE (KOUT,1003) (IO,NUCLID(IO),DCON(IO),IO=1,INUC)
 2000 KBR = 0
      FIRST = .TRUE.
C     BEGIN THE MAIN LOOP THROUGH THE NUCLIDE TABLE.
      DO 250 I = 1,INUC
      BRSUM = 0.0
      ASSIGN 203 TO NGO
C     UNPACK THE NUCLIDE WORD
C     ENSURE THAT SUCCESSIVE DISINTEGRATION CONSTANTS ARE NOT EQUAL
      IF (FIRST) GO TO 2743
      FACTC = DCON(I) - DCON(I-1)
      IF (ABS(FACTC).GE.TOL) GO TO 274
      IF (FACTC) 2741,2742,2742
 2741 DCON(I-1) = DCON(I-1) + TOL
      GO TO 274
 2742 DCON(I) = DCON(I) + TOL
      GO TO 274
 2743 FIRST = .FALSE.
  274 NAME = IABS(NUCLID(I))
      ITRUNC = MOD(NAME,MULT(5))
      MI = MOD(ITRUNC,MULT(1))
      NEWNAM = (NAME/MULT(5))*MULT(5) + MI
      NBR = 4 - MI
CHECK FOR EXISTENCE OF DAUGHTERS
      IF(ITRUNC.EQ.MI)GO TO 250
      IF (NBR)1305,201,202
  201 NBR = 1
      BRSUM = 1.0
      ASSIGN 204 TO NGO
C
CONSIDER EACH BRANCH IN TURN
  202 DO 210 J = 1,NBR
      NTIMES = 0
      IM = 5 -J
      KTYP = ITRUNC/MULT(IM)
      ITRUNC = MOD(ITRUNC,MULT(IM))
      GO TO NGO,(203,204)
  203 KBR = KBR + 1
C     SUM THE BRANCHING RATIOS FOR CHECKING
      BRSUM = BRSUM + BRANCH(KBR)
C     BRANCH ON THE TRANSITION MODE TO SYNTHESIZE THE DAUGHTER NAME
  204 GO TO (211,211,212,212,212,213,214,215),KTYP
C
C     BETA EMISSION
  211 NAMDAU = (NAME/MULT(6))*MULT(1) + MULT(1) + KTYP - 1
C     SET DO PARAMETERS FOR SEARCH IN NEXT 7 ENTRIES
      KST = I + 1
```

```
      KEND = KST + 6
C   SET MODE FOR FURTHER SEARCHES
      ASSIGN 221 TO K2ND
      ASSIGN 219 TO K3RD
      GO TO 216
C
C   ISOMERIC TRANSITION
  212 NAMDAU = (NAME/MULT(6))*MULT(1) + KTYP - 8
C   SET DO PARAMETERS FOR SEARCH IN NEXT 2 ENTRIES
      KST = I + 1
      KEND = KST +1
C   SET MODE FOR FURTHER SEARCHES
      ASSIGN 222 TO K2ND
      ASSIGN 221 TO K3RD
      GO TO 216
C
C   NEUTRON PLUS BETA EMISSION
  213 NAMDAU = (NAME/MULT(6))*MULT(1) - MULT(4) + MULT(1)
C   SET DO PARAMETERS FOR SEARCH IN PRECEDING ENTRIES
      KST = 1
      KEND = I -1
C   SET MODE FOR FURTHER SEARCHES
      ASSIGN 223 TO K2ND
      ASSIGN 219 TO K3RD
      GO TO 216
C
C   POSITRON EMISSION OR ELECTRON CAPTURE
  214 NAMDAU = (NAME/MULT(6))*MULT(1) - MULT(1)
C   SET DO PARAMETERS FOR SEARCH IN PREVIOUS SEVEN ENTRIES
      KEND = I - 1
      KST = KEND - 6
C   SET MODE FOR FURTHER SEARCHES
      ASSIGN 221 TO K2ND
      ASSIGN 219 TO K3RD
      GO TO 216
C
C * * * * * * * * *  CODE INSERTION POINTS * * * * * * * * *
  215 GO TO 210
C * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
C
C   SEARCH FOR THE DAUGHTER IN THE NUCLIDE TABLE
  216 NTIMES = NTIMES + 1
      DO 220 K = KST,KEND
      IF (NAMDAU.EQ.IABS(NUCLID(K))/MULT(5)) GO TO 225
  220 CONTINUE
C
C              SEARCH FAILED, TRY LONGER SEARCH IF POSSIBLE
                 GO TO (217,218,219),NTIMES
C
  217            GO TO K2ND,(221,222,223)
  221            KST = 1
                 KEND = INUC
                 GO TO 216
C
  222            KST = KEND + 1
                 KEND = KST + 4
                 GO TO 216
C
  223            KST = KEND + 1
                 KEND = INUC
```

```
               GO TO 216
C
  218          GO TO K3RD,(219,221)
C             DAUGHTER IS MISSING
  219          GO TO 1306
C
COMPUTE INCREMENT OR DECREMENT OF PARENT INDEX TO FIND DAUGHTER, AND
C   MAKE SURE IT DOES NOT EXCEED 7
  225 INCR = K - I
      IF (IABS(INCR).GT.7) GO TO 1306
C   REVISE THE NUCLIDE NAME
      NEWNAM = NEWNAM + IABS(INCR)*MULT(IM)
C   MARK THE POSITION IF IT BE A DECREMENT.
      IF (INCR)226,227,227
  226 NEWNAM = NEWNAM + IM*MULT(1)
  227 NUCLID(I) = ISIGN(NEWNAM,NUCLID(I))
C   MARK THE DAUGHTER AS N*O*T THE BEGINNING OF A SUBCHAIN.
      NUCLID(K) = IABS(NUCLID(K))
  210  CONTINUE
C
CHECK WHETHER BRANCHING RATIOS ADD UP TO 1.
      IF (ABS(BRSUM-1.0).GT.BRTEST) GO TO 1307
C
  250 CONTINUE
C
      IF (.NOT.NPRNT(3)) GO TO 2500
      WRITE (KOUT,1004)
      WRITE (KOUT,1002)
      WRITE (KOUT,1003) (IO,NUCLID(IO),DCON(IO),IO=1,INUC)
      WRITE (KOUT,1005)
      WRITE (KOUT,1006) (IO,BRANCH(IO),IO=1,IBRA)
 2500 GO TO ISTOP,(99,300)
  300 RETURN
C
C  *  *  *  *  *  *  *  *  *  ERROR FORMATS  *  *  *  *  *  *  *  *  *  *  *
C
 1351 FORMAT (37H0FAULTY INPUT RECORD HAS BEEN OMITTED//)
 1352 FORMAT (22H0KTYP + NDAUT NEGATIVE//)
 1353 FORMAT (40H0DUPLICATE INPUT RECORD HAS BEEN OMITTED//)
 1354 FORMAT  (7H0DCON, 1PE10.3,13H FOR NUCLID, O12,27H INCONSISTENT WIT
     1H LAMBDA, 1PE10.3//)
 1355 FORMAT (21H0TOO MANY DAUGHTERS, O12)
 1356 FORMAT (11H0DAUGHTER, O7,28H NOT FOUND OR INCR EXCEEDS 7)
 1357 FORMAT (23H0BRANCHING RATIOS FOR, O12,20H, DO NOT ADD UP TO 1)
 1358 FORMAT (40H0DIMENSIONS OF NUCLID HAVE BEEN EXCEEDED)
C
C  *  *  *  *  *  *  *  *  *  ERROR TRACES  *  *  *  *  *  *  *  *  *  *  *
C
 1301 WRITE (KOUT,1351)
 1310 WRITE (KOUT,INPUT)
      GO TO 10
C
 1302 WRITE (KOUT,1352)
      ASSIGN 99 TO ISTOP
      GO TO 1310
C
 1303 WRITE (KOUT,1353)
      GO TO 1310
C
 1304 WRITE (KOUT,1354) DCON(IND),NUCLID(IND),LAMBDA
```

```
      ASSIGN  99   TO ISTOP
      GO TO 1310
C
 1305 WRITE (KOUT,1355) NUCLID(I)
      ASSIGN 99 TO ISTOP
      GO TO 250
C
 1306 WRITE (KOUT,1356) NAMDAU
      ASSIGN 99 TO ISTOP
      GO TO 210
C
 1307 WRITE (KOUT,1357) NUCLID(I)
      ASSIGN 99 TO ISTOP
      GO TO 250
C
 1308 WRITE (KOUT,1358)
      ASSIGN 99 TO ISTOP
      GO TO 1212
C
   99 CALL DUMP
      STOP
C
      END
$IBFTC YLD1    LIST,DECK,M94/2
      SUBROUTINE YIELD
     1    (INTP,FISSID)
C     VERSION 1
C     R C TOMPKINS -- US ARMY NUCLEAR DEFENSE LABS
C     14 SEPTEMBER 1966
C
CALLED BY PAM1
C
C  * * * * * * * * * *  GLOSSARY  * * * * * * * * * * * * *
C
C   ABEGN(700)      INITIAL FISSION PRODUCT ABUNDANCES IN ATOMS/10000
C                   FISSIONS (PARALLEL TO NPARNT)
C   FISSID          TYPE OF FISSION REQUESTED BY USER
C   FISTYP(6)       TYPES OF FISSION CORRESPONDING TO DATA FIELDS ON
C                   FISSION YIELD CARDS
C   FYLDIN          FISSION YIELD ON INPUT CARD (YIELD)
C   NSTAT           ISOMER NUMBER ON
C                   FISSION YIELD CARD (YIELD), CF. LISOM
C                   ERM CARD (XPRM) .
C                       GROUND STATE 0 OR 2
C                       EXCITED STATE 1
C
C  * * * * * * * * * * * * * * * * * * * * * * * *
C
      COMMON/FISHIN/
     1    ABEGN (700) ,ABUNDO(700) ,BRANCH(130) ,CAPFIS
     2   ,DCON  (700) ,IBRA        ,INUC        ,MAXNUC
     3   ,MULT  (11)  ,NUCLID(700)
      COMMON/UTILTY/
     1    KOUT        ,NPRNT (15)
C
      DIMENSION FMT(4),XSPEC(6),FISTYP(6)
      DIMENSION INFORM(11),LIM(11),MEM(700),NUC(11)
      EQUIVALENCE (MEM,ABUNDO)
C
      INTEGER A,B,BLANK,FISSID,FISTYP
```

```
      LOGICAL NPRNT
C
      DATA FMT(1),FMT(2),FMT(4)/6H(I5,I4,6H,A1,  ,6HE10.0)/,
     1     (XSPEC(I),I=1,6)/6H      ,6H10X   ,6H20X   ,6H30X   ,
     2     6H40X   ,6H50X   /
      DATA BLANK,A,B/1H ,1HA,1HB/
C
      DO 50 JJ=1,INUC
   50 ABEGN(JJ) = -1.0
      ASSIGN 213 TO IFLAG
C     FIND THE RIGHT DATA
  202 READ (INTP,101) (FISTYP(I),I=1,6)
C     GO AHEAD IF WE FOUND IT, ELSE STOP
      IF (FISTYP(1).EQ.BLANK) GO TO IFLAG,(213,16)
      DO 203 K=1,6
      IF (FISTYP(K).EQ.FISSID) GO TO 204
  203 CONTINUE
C
 2031 READ (INTP,103) NMAS
      IF (NMAS)202,202,2031
  204 FMT(3) = XSPEC(K)
    1 READ (INTP,FMT) NMAS,NAT,NSTAT,FYLDIN
C     MAKE A NOTE THAT WE FOUND IT
      ASSIGN 16 TO IFLAG
      IF(NMAS)17,202,2
  213 WRITE (KOUT,1304) FISSID
      STOP
COMPATIBILIZE THE ISOMERIC STATE INDICATORS
    2 IF (NSTAT.EQ.BLANK) NSTAT=0
      IF (NSTAT.EQ.A) NSTAT=1
      IF (NSTAT.EQ.B) NSTAT=2
      IF (NSTAT.GT.3) WRITE (KOUT,1305) NMAS,NAT,NSTAT,FYLDIN
      NAMC = NMAS*MULT(4) + NAT*MULT(1) + NSTAT
C
      DO 10 I=1,INUC
   10 IF (IABS(NUCLID(I))/MULT(5).EQ.NAMC) GO TO 12
      GO TO 1
CHECK CONTENTS OF ABEGN
   12 IF (ABEGN(I))14,13,13
COMPILE FYLDIN INTO ARRAY
   14 ABEGN(I) = FYLDIN
      GO TO 1
C
   13 WRITE (KOUT,1301)
     1      NUCLID(I),ABEGN(I)
      IF(ABEGN(I)-FYLDIN)14,1,14
   17 WRITE (KOUT,1302)
      BACKSPACE INTP
      READ (INTP,1303)
      WRITE (INTP,1303)
      GO TO 1
CHECK FOR COMPLETENESS
   16 DO 18 J=1,INUC
      IF(ABEGN(J))15,18,18
   15 CONTINUE
      ABEGN(J) = 0.0
   18 CONTINUE
      IF (.NOT.NPRNT(4)) GO TO 99
      WRITE (KOUT,1001) FISSID
      DO 1000 IO = 1,INUC
```

```
      NAME = IABS(NUCLID(IO))/MULT(5)
      CALL UNPACK (NMAS,NAT,NSTAT,NAME)
 1000 WRITE (KOUT,1002) NMAS,NAT,NSTAT,ABEGN(IO)
CODING TO PREVENT DUPLICATION OF FISSION YIELDS FOR NUCLIDES THAT ARE
C   MEMBERS OF MORE THAN ONE SUBCHAIN
   99 DO 100 KM =1,INUC
  100 MEM(KM) = 0
      DO 500 IN = 1,INUC
C   FIND THE NEXT NUCLIDE THAT BEGINS A SUBCHAIN
      IF (NUCLID(IN))411,411,500
C
C   SET PARAMETERS FOR BEGINNING OF A SUBCHAIN
C         MEMBERSHIP COUNTER
  411 LSUB = 1
      JL = 0
C         STARTING INDEX
      NUC(1) = IN
  412 LIM(LSUB) =
C   PROCESS A SUBCHAIN MEMBER
  413 KP = NUC(LSUB)
      IM = LIM(LSUB)
      INFO = MOD(IABS(NUCLID(KP)),MULT(5))
      INFORM(LSUB) = INFO
      INC = 1
CHECK FOR END OF SUBCHAIN
      IF (INFO.EQ.4) GO TO 421
C   EXTRACT THE DAUGHTER INCREMENT
      ID = MOD(INFO,MULT(IM+1))/MULT(IM)
C   SEE IF THIS INCREMENT SHOULD BE NEGATIVE
      IF (MOD(INFO,MULT(2))/MULT(1).EQ.IM) GO TO 414
      IF (LSUB.EQ.JL) GO TO 415
C   RECORD THE MEMBERSHIP OF NUCLID(KP) IN THIS SUBCHAIN
      MEM(KP) = MEM(KP) +1
      GO TO 415
  414 INC = -INC
COMPUTE DAUGHTER INDEX
  415 NDAUT = KP + INC*ID
C   ACCEPT THE DAUGHTER FOR MEMBERSHIP AND RECYCLE
      LSUB = LSUB + 1
      IF (LSUB.GT.11) GO TO 500
      NUC(LSUB) = NDAUT
      GO TO 412
C
  421 IF (LSUB.EQ.1) GO TO 500
C   FIND THE LAST BRANCH IN THE SUBCHAIN
      LAST = LSUB + 1
      DO 422 L = 2,LSUB
      LBACK = LAST - L
      JL = LBACK
      IM = LIM(LBACK)
      IF (MOD(INFORM(LBACK),MULT(IM))/MULT(IM-1))422,422,431
  422 CONTINUE
      GO TO 500
C
C   SET UP A NEW SUBCHAIN STARTING FROM THE DEEPEST UNEXPLORED BRANCH
  431 LSUB = LBACK
      LIM(LSUB) = LIM(LSUB) -1
      GO TO 413
  500 CONTINUE
C
```

```
      DO 600 KA =1,INUC
      DIV = MEM(KA)
      IF (DIV) 613,600,601
  601 ABEGN(KA) = ABEGN(KA)/DIV
      GO TO 600
  613 WRITE (6,6130) KA
 6130 FORMAT (15HOMINUS MEM FOR I3)
  600 CONTINUE
      RETURN
C
  101 FORMAT(6A6)
  103 FORMAT(I5)
 1001 FORMAT (20H1FISSION YIELDS FOR A6//5X4HMASS5X6HCHARGE5X6HISOMER5X2
     15HYIELD PER 10,000 FISSIONS/)
 1002 FORMAT (5XI3,7XI3,9XI1,14X1PE12.4)
 1301 FORMAT (9HONUCLIDE O12,11H WITH YIELD1PE12.4,14H IS DUPLICATED)
 1302 FORMAT (24HOCARD WITH NEGATIVE MASS)
 1303 FORMAT(80H
     1                                           )
 1304 FORMAT (32HONO FISSION YIELD AVAILABLE FOR A6)
 1305 FORMAT (9HOBAD CARD/5X2I3,A3,5X1PE12.4)
      END
$IBFTC XPRMX    LIST,DECK,M94/2
      SUBROUTINE XPRM
     1     (INTP)
C
C     R C TOMPKINS - US ARMY NUCLEAR DEFENSE LABS
C     NOVEMBER 1966
CALLED BY PAM1
C
C  * * * * * * * * * GLOSSARY * * * * * * * * * * *
C
C   ERM(181)       EXPOSURE RATE MULTIPLIERS FOR GAMMA-EMITTING FISSION
C                  PRODUCTS (CF. XPRM AND GXPSR)
C   JRM(181)       CROSS REFERENCE TO INDICES OF NPARNT (XPRM AND GXPSR)
C                  PARALLEL TO ERM
C   KRM            NUMBER OF FISSION PRODUCTS CONTRIBUTING TO GAMMA DOSE
C                  (XPRM AND GXPSR)
C   NSTAT          ISOMER NUMBER ON
C                  FISSION YIELD CARD (YIELD), CF. LISOM
C                  ERM CARD (XPRM) -
C                      GROUND STATE 0 OR 2
C                      EXCITED STATE 1
C   XRM            EXPOSURE RATE MULTIPLIER ON ERM CARD (XPRM)
C
C  * * * * * * * * * * * * * * * * * * * * * * * *
C
      COMMON/FRYLNG/
     1    BSUBK (90)   ,ERM    (185) ,JRM    (185) ,KRM      ,ECF(90)
      COMMON/FISHIN/
     1    ABEGN (700) ,ABUNDO(700) ,BRANCH(130) ,CAPFIS
     2   ,DCON  (700) ,IBRA          ,INUC          ,MAXNUC
     3   ,MULT  (11)  ,NUCLID(700)
      COMMON/UTILTY/
     1    KOUT         ,NPRNT (15)
      DIMENSION NAME(181)
      LOGICAL JD,IGO,KDOS,NPRNT
C
 1001 FORMAT (2X2I3,I2,E8.3)
 1002 FORMAT
```

```
     1    (15H1OUTPUT OF XPRM//5X5HINDEX5X2HIA5X2HIZ5X2HIS5X3HJRM9X3HERM
     2    //)
 702 FORMAT
     1    (6XI3,5XI3,5XI2,6XI1,5XI3,5X1PE10.3)
1311 FORMAT (22HONEGATIVE MASS IN XPRM)
1312 FORMAT (19HOTOO MANY ERM CARDS)
1313 FORMAT (55HOTHE FOLLOWING ERM CARDS HAVE NO COUNTERPARTS IN NUCLID
     1)
1323 FORMAT (5XO7,5XE8.3)
C
C   INITIALIZE VARIABLES
      LT = 1
      MAXERM = 101
      DO 1 I = 1,MAXERM
      ERM(I) = 0.0
      NAME(I) = 0.0
    1 JRM(I) = 0
      LAST = 0
      KRM = 0
C
C
C
C  READ A CARD
    2 READ (INTP,1001)
     1    NMAS,NAT,NSTAT,XRM
CHECK FOR END-OF-FILE SENTINEL
      IF (NMAS)1301,6,3
    3 IF(KRM.EQ.MAXERM) GO TO 1302
      KRM = KRM + 1
COMPATIBILIZE THE ISOMERIC STATE INDICATORS
      MS = NSTAT + 1
      GO TO (5,5,4),MS
C
    4 NSTAT = 0
C   PACK THE NUCLIDE NAME
    5 NAME(KRM) = NMAS*MULT(4) + NAT*MULT(1) + NSTAT
      ERM(KRM) = XRM
C
      GO TO 2
C   MATCH THE NAMES
    6 DO 100 K = 1,INUC
      NUCNAM = IABS(NUCLID(K))/MULT(5)
      DO 10 L = LT,KRM
      NAML = NAME(L)
    7 IF (NAML.EQ.NUCNAM) GO TO 11
   10 CONTINUE
      GO TO 100
C
   11 NUMAS = NAML/MULT(4)
CHECK FOR BEGINNING OF MASS CHAIN
      IF (NUMAS - LAST)12,13,12
   12 TEMP = -ERM(L)
      GO TO 14
   13 TEMP = ERM(L)
      IF (LT.EQ.KRM) GO TO 101
   14 LAST = NUMAS
C   ORDER THE ARRAYS
      MB = L
      MT = LT + 1
      LL = MB + MT
```

```
C
      DO 20 M = MT,MB
      MM = LL - M
      ERM(MM) = ERM(MM-1)
   20 NAME(MM) = NAME(MM-1)
C
      ERM(LT) = TEMP
      NAME(LT) = 0
      JRM(LT) = K
      LT = MT
C
  100 CONTINUE
C   ERROR TRACE ON NORMAL EXIT
      GO TO 1303
C   PROCESS THE LAST ENTRY
  101 JRM(KRM) = K
      ERM(KRM) = TEMP
      NAME(KRM) = 0
C   OUTPUT RESULTS ON REQUEST
      IF (.NOT.NPRNT(5)) RETURN
      WRITE (KOUT,1002)
      DO 700 I=1,KRM
      JR = JRM(I)
      NAMO = IABS(NUCLID(JR))/MULT(5)
      CALL UNPACK(IA,IZ,IS,NAMO)
  700 WRITE (KOUT,702)
     1     I,IA,IZ,IS,JRM(I),ERM(I)
      RETURN
C * * * * * * ERROR TRACES * * * * * * *
 1301 WRITE (KOUT,1311)
      WRITE (KOUT,1001) NMAS,NAT,NSTAT,XRM
      GO TO 2
 1302 WRITE (KOUT,1312)
      STOP 1302
 1303 WRITE (KOUT,1313)
      WRITE (KOUT,1323) (NAME(L),ERM(L),L=LT,KRM)
      KRM = LT - 1
      GO TO 101
      END
$IBFTC INDX     LIST,DECK,M94/2
      SUBROUTINE INDCD1
     1     (EMITN , HOB   , KRD   , TW    )
CALLED BY PAM1
C      INDCD IS MODIFIED VERION OF JONES-HOFFMAN INDUCED
C      COMPUTER PROGRAM, USNRDL LR-
C
C      NOVEMBER 1966
C
C  *   *   *   *   *   *   *   *   *   *  GLOSSARY  *   *   *   *   *   c   *   *   *   *   *
C
C    ALB            NEUTRON ALBEDO OF SOIL
C    FAC(7,18)      NUMBER OF ATOMS OF ISOTOPE I OF ELEMENT J ACTIVATED
C                   PER NEUTRON (CF. INDCD1 AND INDCD2)
C    FAI(7,18)      ATOMS OF ISOTOPE I OF J PER ATOM OF J
C    FAT(18)        ATOMS OF ELEMENT I PER ATOM OF SOIL
C    FM(18)         MASS FRACTION OF ELEMENTS IN SOIL
C                   (CF. CASSIDY/ JNES FW)
C    FOG(5,7,18)    PHOTONS PER DISINTEGRATION OF ENERGY I OF ISOTOPE J OF
C                   ELEMENT K (INDCD1 AND INDCD2)
C    FOM            FRACTIONS OF NEUTRONS SEEN BY APPARENT CRATER
```

```
C   HL(7,18)        HALF LIFE OF CAPTURE PRODUCT OF ISOTOPE I OF ELEMENT J
C   HOB             HEIGHT OF BURST IN FEET
C   HSCL            SCALED HEIGHT OF BURST (W**1/3 IN INDCD2)
C   ISO(18)         NUMBER OF ISOTOPES OF EACH ELEMENT OCCURRING IN NATURE
C   KEV(7,18)       NUMBER OF PHOTON ENERGIES EMITTED BY CAPTURE PRODUCT
C                   OF I OF J
C   LH(7,18)        UNITS OF HL,CF, IUNIT
C   NA(7,18)        MASS NUMBER OF ISOTOPE I OF ELEMENT J
C   NZ(18)          ATOMIC NUMBERS OF SOIL ELEMENTS
C   RNY(5,7,18)     EXPOSURE RATE MULTIPLIERS FOR PHOTON ENERGIES PARALLEL
C                   TO FOG
C   SIGI(7,18)      THERMAL NEUTRON ABSORPTION CROSS SECTION OF ISOTOPE I
C                   OF ELEMENT J (BARNS)
C   SIGISC(7,18)    THERMAL NEUTRON SCATTERING CROSS SECTION OF ISOTOPE I
C                   OF ELEMENT J (BARNS)
C   SIGS            THERMAL NEUTRON ABSORPTION CROSS SECTION OF SOIL
C                   (BARNS)
C   SIGSSC          THERMAL NEUTRON SCATTERING CROSS SECTION OF SOIL
C                   (BARNS)
C   XLAM(7,18)      DISINTEGRATION CONSTANT OF CAPTURE PRODUCT OF ISOTOPE
C                   I OF ELEMENT U
C
C * * * * * * * * * * * * * * * * * * * * * * * *
C
      COMMON/INDUCE/
     1    ALBFOM       ,FAC   (7,18),FOGRNY(7,18),ISO   (18)
     2   ,LMAX         ,XLAM  (7,18)
C
      COMMON/UTILTY/
     1    KOUT         ,NPRNT (15)
C
      DIMENSION
     1  A (7, 18),    FAI (7, 18), FAT(18),  FM(18),    FOG(5,7,18),
     2HL(7,18),  NZ(18),          LH (7, 18), NA (7, 18), RNY(5,7,18),
     3KEV(7,18),
     4 SA (18), SFAI (18), SFAISC (18), SIGI (7, 18), SIGISC (7, 18)
C
      LOGICAL NPRNT
C
   10 FORMAT(I2,8X,F10.0)
   14 FORMAT (I2,I5,E13.3)
  016 FORMAT (
     1  I3, I2, F9.5, F15.5, E10.3, I3, F15.5)
   18 FORMAT (F10.0,E10.0)
  601 FORMAT
     1    (17H1OUTPUT OF INDCD1/22H0NUMBER OF ELEMENTS = I2/42H0NUMBER O
     2F NEUTRONS EMITTED PER FISSION = F5.2/
     4    / 9H0    INDEX5X3HISO10X3HFAC12X4HXLAM9X3HKEV9X3HFOG12X3HRNY/)
  602 FORMAT
     1    (//6XI2,8XI1,6X1PE12.3,5XE10.3,6XI1,6X0PF10.5,5X1PE10.3)
  603 FORMAT
     1    (63X0PF10.5,5X1PE10.3)
  604 FORMAT
     1    (1H022X1PE12.3,5XE10.3,6XI1,6X0PF10.5,5X1PE10.3)
C                                      ELEMENTS OF CASING ARE
C                                      IGNORED IN THIS COMPUTATIONS
C
      HOBLMT = 36.0
      DOBLMT = -2.0
  100 READ          (KRD, 10)
```

```
      1  LMAX
        IF(LMAX)700,700,102
  102 READ        (KRD, 14)
      1  (NZ(L), ISO(L), FM(L), L=1, LMAX)
        DO 103 L = 1, LMAX
        IS = ISO(L)
  103 READ                      (KRD, 16)
      1  (NA(I,L), KEV(I,L), FAI(I,L), SIGI(I,L), HL(I,L), LH(I,L),
      2  SIGISC (I, L), I = 1, IS)
       DO 104 L = 1, LMAX
       IS = ISO(L)
       DO 104 I = 1, IS
       KE = KEV(I,L)
  104 READ          (KRD, 18)
      1  (FOG(N,I,L), RNY(N,I,L), N=1, KE)
       IF(EMITN)700,700,105
  105  SIGS= 0.
       SIGSSC= 0.0
       SFWMAX=0.
       DO 120 L=1, LMAX
       SA(L)=0.
       IS=ISO(L)
       DO 110 I=1, IS
       A(I,L)=NA(I,L)
  110 SA(L)= SA(L)+A(I,L)*FAI(I,L)
  120 SFWMAX=SFWMAX+FM(L)/SA(L)
       DO 150 L=1, LMAX
       FAT(L) = FM(L)/(SA(L)*SFWMAX)
       SFAI(L)=0.
       SFAISC(L)=0.0
       IS=ISO(L)
       DO 140 I=1, IS
       SFAISC(L) = SFAISC (L)+FAI(I,L)* SIGISC(I,L)
  140 SFAI(L) = SFAI(L)+FAI(I,L)*SIGI(I,L)
       SIGSSC=SIGSSC+FAT(L)*SFAISC(L)
  150 SIGS=SIGS+FAT(L)*SFAI(L)
  152 DO 200 L=1, LMAX
       IS=ISO(L)
       DO 200 I=1, IS
       FOGRNY(I,L) = 0.
       KE = KEV(I,L)
       DO 210 N = 1, KE
  210 FOGRNY(I,L) = FOGRNY(I,L) + FOG(N,I,L)*RNY(N,I,L)
       FAC(I,L)=FAT(L)*FAI(I,L)*SIGI(I,L)/SIGS
       HL(I,L)=TIMSEC(HL(I,L),LH(I,L),0)
  200 XLAM(I,L)=.693/HL(I,L)
C      REDUCTION OF SOIL EXP. RATE IS NOW MADE AC
C      THE SOLID ANGLE FRACTION OF THE FIREBALL TOUCHING THE GROUND AT
C      THE TIME OF HYDRODYNAMIC SEPARATION, AND THE FRACTION OF
C      NEUTRONS THAT REMAIN IN THE SOIL AFTER ALBEDO.
       HSCL=HOB/TW**0.33333333
  272 IF (HSCL.LT.HOBLMT) GO TO 274
  273 FOM=0.0
       ALB=0.0
       GO TO 287
  274 IF(HSCL)276,277,275
  275 FOM=1.-HSCL/SQRT(4.24*HSCL*HSCL-234.*HSCL+4225.)
       GO TO 286
  276 IF (HSCL.LT.DOBLMT) GO TO 278
  277 FOM=1.0
```

```
      GO TO 286
  278 ALB=1.0
      FOM=1.0
      GO TO 287
  286 ALB=1.155*SQRT(SIGS/(SIGSSC+SIGS))
  287 ALBFOM = EMITN*FOM*ALB*1.E4
      IF (.NOT.NPRNT(8)) RETURN
    6 WRITE (KOUT,601)
     1     LMAX,EMITN
C
      DO 605 I=1,LMAX
      IS = ISO(I)
      WRITE (KOUT,602)
     1     I,IS,FAC(1,I),XLAM(1,I),KEV(1,I),FOG(1,1,I),RNY(1,1,I)
      KE=KEV(1,I)
      IF(KE.GT.1)
     1WRITE (KOUT,603)
     1     (FOG(K,1,I),RNY(K,1,I),K=2,KE)
      IF(IS.EQ.1) GO TO 605
C
      DO 600 J=2,IS
      KE = KEV(J,I)
      WRITE (KOUT,604)
     1     FAC(J,I),XLAM(J,I),KE,FOG(1,J,I),RNY(1,J,I)
      IF(KE.GT.1)
     1WRITE (KOUT,603)
     1     (FOG(K,J,I),RNY(K,J,I),K=2,KE)
  600 CONTINUE
  605 CONTINUE
  700 RETURN
      END
$IBFTC FRTAB   LIST,BECK,M94/2
      SUBROUTINE FRATIO
     1     (SLDTMP,THSD,MCHN)
C
C     R C TOMPKINS -- US ARMY NUCLEAR DEFENSE LABS
C     SEPTEMBER 1966
C
      COMMON  /SET3/
     1     BZ            ,BZ2          ,BZZ          ,BZ22
     2    ,DELTAX        ,DGX          ,DGY          ,DIFCON
     3    ,DIFADJ        ,FMAS(500)    ,FMASS(200)   ,IC(18)
     4    ,ICON          ,ICTR         ,IH           ,IOT(18)
     5    ,IP            ,IPOUT        ,ITT(18)      ,IV
     6    ,JC(18)        ,JIN          ,JOUT         ,JPOUT
     7    ,KTR(500)      ,KTAPE        ,LAST         ,MAPRUN
     8    ,MARRAY        ,MIN          ,MXREQ
     9    ,N             ,NA           ,NBZX         ,NBZX2
     1    ,NBZY          ,NCL          ,NE           ,NF
     2    ,NIJ           ,NMAP         ,NMAX         ,NOX
     3    ,NP(21)        ,NREQ         ,NS           ,NTAPES
     4    ,NTAPET        ,NTASK        ,NXMAP        ,NYMAP
     5    ,YMIN          ,PS(500)      ,PSIZE(200)   ,PACT(200)
     6    ,ROPART                      ,T(500)       ,T1
     7    ,T2            ,TLIMIT       ,X(500)       ,XF
     8    ,X0            ,XMAX         ,XMIN         ,XNMAP
     9    ,X1            ,X2           ,X3           ,X4
     1    ,Y(500)        ,YF           ,Y0           ,YMAX
      COMMON/OUTPUT/
     1     FISNUM      ,FP     (200) ,FM           ,ITAB         ,JG0
```

```
     2    ,MASCHN       ,SIGMAS
      COMMON/FISHIN/
     1     ABEGN [700] ,ABUNDO[700] ,BRANCH[130] ,CAPFIS
     2    ,DCON  [700] ,IBRA         ,INUC        ,MAXNUC
     3    ,MULT  [11]  ,NUCLID[700]
C
      COMMON/UTILTY/
     1     KOUT         ,NPRNT [15]
C
      COMMON/FRYLNG/
     1     BSUBK [90]  ,ERM    [185] ,JRM    [185] ,KRM     ,ECF[90]
C
      COMMON/DECAY/
     1     IGO          ,JD           ,KDOS         ,TENTER
     2    ,TEXIT        ,TIME
C
C
      DIMENSION FR[90]
      DIMENSION BOIL[40]
C
      EQUIVALENCE [FR,BSUBK]
C
      LOGICAL NPRNT,IGO,JD,NOTO,KDOS
C
      DATA BOIL/2*3173.0,2907.0,3000.0,2976.0,1764.0,1010.0,1026.0,331.8
     1,120.1,1656.0,3497.0,4695.0,4808.0,3300.0,1351.0,583.0,4505.0,4149
     2.0,3436.0,2451.0,1832.0,2123.0,2247.0,1832.0,1534.0,457.4,165.9,15
     355.0,3003.0,4608.0,4367.0,4252.0,4464.0,4318.0,5*4300.0/
C
C
      TIME = TMSD
      IGO = .FALSE.
      JD = .TRUE.
      KDOS = .FALSE.
      MAXCHN = 90
      DO 30 I = 1,MAXCHN
   30 FR[I] = 0.0
C
      CALL BATMAN
C
      MCHN = 0
      RFRC = 0.0
      CHN = 0.0
      LAST = IABS[NUCLID[1]]/MULT[9]
      NOTO = .FALSE.
C
      DO 10 MB = 1,INUC
      NAME = IABS[NUCLID[MB]]/MULT[6]
      MASS = NAME/MULT[3]
      NAT = MOD[NAME,MULT[3]]
      IF [NAT.GE.27.AND.NAT.LE.66] GO TO 1
      WRITE [KOUT,513] NAT,MASS
      ABUND = 0.0
      GO TO 10
    1 IF [MASS.EQ.LAST]GO TO 3
      MCHN = MCHN + 1
      IF [NOTO] FR[MCHN] = RFRC/CHN
      RFRC = 0.0
      CHN = 0.0
      NOTO = .FALSE.
```

```
    3 ABUND = ABUNDO(MB)                                                 FRTA  89
      LAST = MASS                                                        FRTA  90
      IF (ABUND)10,10,4                                                  FRTA  91
    4 NOTO = .TRUE.                                                      FRTA  92
      IF (BOIL(NAT-26).GE.SLDTMP) RFRC = RFRC + ABUND                    FRTA  93
      CHN = CHN + ABUND                                                  FRTA  94
   10 CONTINUE                                                           FRTA  95
      MCHN = MCHN + 1                                                    FRTA  96
      IF (NOTO) FR(MCHN) = RFRC/CHN                                      FRTA  97
C                                                                        FRTA  98
      IF (NPRNT(6)) GO TO 22                                             FRTA  99
   19 DO 32 L = 1,MCHN                                                   FRTA 100
      BSUBK(L) = SQRT(FR(L)) - 1.0                                       FRTA 101
      POWER = BSUBK(L)                                                   FRTA 102
      SUM = 0.0                                                          FRTA 103
      DO 20 M = 1,ITAB                                                   FRTA 104
   20 SUM = SUM + FMASS(M)*PSIZE(M)**POWER                               FRTA 105
   32 ECF(L) = 1.0/SUM                                                   FRTA 106
      IF (NPRNT(7)) GO TO 23                                             FRTA 107
   21 IGO = .TRUE.                                                       FRTA 108
      RETURN                                                             FRTA 109
   22 WRITE (KOUT,501)                                                   FRTA 110
      WRITE (KOUT,502) (J,FR(J),J=1,MCHN)                                FRTA 111
      GO TO 19                                                           FRTA 112
   23 WRITE (KOUT,503)                                                   FRTA 113
      WRITE (KOUT,502) (K,BSUBK(K),K=1,MCHN)                             FRTA 114
      GO TO 21                                                           FRTA 115
  501 FORMAT                                                             FRTA 116
     1     (17H1OUTPUT OF FRATIO//6X4HMCHN 10X2HFR//)                    FRTA 117
  502 FORMAT                                                             FRTA 118
     1     (7XI2,6X1PE12.4)                                              FRTA 119
  503 FORMAT(///6X4HMCHN9X5HBSUBK//)                                     FRTA 120
  513 FORMAT (44H0BOILING POINT IS NOT AVAILABLE FOR ELEMENT I3,         FRTA 121
     1  6H(MASS I3,1H))                                                  FRTA 122
      END                                                                FRTA 123
     1  6H(MASS I3,1H))                                                  FRTA 122
$IBFTC LNK9     LIST,DECK,M94/2                                          LNK9   0
      SUBROUTINE LINK9                                                   LNK9   1
C      26 FEB 67                                                         LNK9   2
C     SECOND HALF OF THE OUTPUT PROCESSOR                                LNK9   3
C     SUBROUTINES CALLED                                                 LNK9   4
C     MAP                                                                LNK9   5
C     RUN1                                                               LNK9   6
C     SLIDE                                                              LNK9   7
C     LETSGO                                                             LNK9   8
C     SHIFT                                                              LNK9   9
C     CALC                                                               LNK9  10
C     CROP                                                               LNK9  11
C     ZERO                                                               LNK9  12
C     PROC                                                               LNK9  13
C     COUNT                                                              LNK9  14
C                                                                        LNK9  15
C ***********************************************************************LNK9  16
C                                                                        LNK9  17
      COMMON /SET1/                                                      LNK9  18
     1         DIAM    ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT    ,  LNK9  19
     2         SD      , SPAR    , SSAM   , THE    , TMP1   , TMP2     ,  LNK9  20
     3         TSM     , U       , VPR    , W      , MBURST , SCLDMB   ,  LNK9  21
     4         TOD(48) , RMIN    , IDISTR , SPAR1  , MGTAPE , FSUM     ,  LNK9  22
     5         MOPSAM  , SUBRAD  , RADMAX , XGZ    , YGZ    , TGZ         LNK9  23
```

```
      COMMON  /SET3/
     1      BZ             ,BZ2            ,BZZ            ,BZ22
     2    ,DELTAX          ,DGX            ,DGY            ,DIFCON
     3    ,DIFADJ          ,FMAS(500)      ,FMASS(200)     ,IC(18)
     4    ,ICON            ,ICTR           ,IH             ,IOT(18)
     5    ,IP              ,IPOUT          ,ITT(18)        ,IV
     6    ,JC(18)          ,JIN            ,JOUT           ,JPOUT
     7    ,KTR(500)        ,KTAPE          ,LAST           ,MAPRUN
     8    ,MARRAY          ,MIN            ,MXREQ
     9    ,N               ,NA             ,NBZX           ,NBZX2
     1    ,NBZY            ,NCL            ,NE             ,NF
     2    ,NIJ             ,NMAP           ,NMAX           ,NOX
     3    ,NP(21)          ,NREQ           ,NS             ,NTAPES
     4    ,NTAPET          ,NTASK          ,NXMAP          ,NYMAP
     5    ,YMIN            ,PS(500)        ,PSIZE(200)     ,PACT(200)
     6    ,ROPART                          ,T(500)         ,T1
     7    ,T2              ,TLIMIT         ,X(500)         ,XF
     8    ,XO              ,XMAX           ,XMIN           ,XNMAP
     9    ,X1              ,X2             ,X3             ,X4
     1    ,Y(500)          ,YF             ,YO             ,YMAX
      COMMON/OUTPUT/
     1     FISNUM       ,FP     (200) ,FW            ,ITAB          ,JGO
     2    ,MASCHN       ,SIGMAS
      COMMON/DECAY/
     1     IGO          ,JD           ,KDOS          ,TENTER
     2    ,TEXIT        ,TIME
C
      COMMON /SET4/  OMAP(4000)
C
C **********************************************************************
C
 1    FORMAT(12A6)
 2    FORMAT (//15X,23HSUM OF MAP ORDINATES = E13.6 )
 3    FORMAT(1H1////54X,11H* * * * * *)
 4    FORMAT (//15X,23HGROUND ROUGHNESS FACTOR F10.3 )
 9    FORMAT(7F10.3)
 15   FORMAT(18I4)
 17   FORMAT(32H OUTPUT PROCESSING IS COMPLETED.)
 23   FORMAT(1H1///39X27H****  OUTPUT PROCESSOR TASKI5,6H  ****)
 24   FORMAT(///15X25HGRID LIMITS AND INTERVALS/18X4HXMIN10X4HXMAX10X4HY
     1MIN10X4HYMAX10X7HDELTA X10X7HDELTA Y/15XF10.0,4XF10.0,4XF10.0,4XF1
     20.0,5XF10.1,5XF10.1)
 25   FORMAT(//15X71HTHE CONTROL VARIABLE ARRAY, JC(J), HAS BEEN GIVEN T
     1HE FOLLOWING VALUES./15X18I4)
 27   FORMAT(/15X32HMAPPED ON GRID INTERVALS  DGX = F10.1,7H   DGY=F10.1
     1)
 31   FORMAT(117H0INADEQUATE PRINTER DESCRIPTION. AN UNDISTORTED MAP CAN
     1NOT BE GUARANTEED. THIS RUN HAS CONTINUED WITH GRID INTERVALS /5X3
     23H ADJUSTED FOR MAXIMUM EFFICIENCY.)
 32   FORMAT(I4,2F10.3 ,I4)
 33   FORMAT(25H0UNACCEPTABLE REQUEST ...I4)
 34   FORMAT(//////15X,15HREQUEST NUMBER I4///15X,5HTYPE I4,10X5HT1 = F1
     10.1,10X,5HT2 = F10.1,10X,9HMASCHN = I4)
 35   FORMAT(I5)
C
C **********************************************************************
C **********************************************************************
C
      DATA PROGRM  /6H LINK9/
      LOGICAL JD,KDOS,IGO
```

```
C
      IGO=.TRUE.
      NUL=0
      FSUM=0.0
  119 IF(FSUM.EQ.0.0)  GO TO 1191
      WRITE(ISOUT,2) FSUM
      FSUM=0.0
C
C1191 READ LIMITS ON AREA OF INTEREST
 1191 READ (ISIN,9) XMAX,XMIN,YMAX,YMIN,DGX,DGY,GRUFF
      IF (GRUFF.EQ.0.0)  GRUFF = 1.0
      IF(DGX+DGY)120,120,121
  120 WRITE (ISOUT,17)
      REWIND IPOUT
      PRINT 17
      RETURN
C
C     READ OTHER SPECIFIC INPUT
  121 READ (ISIN,15)(JC(J),J=1,18)
      NTASK=NTASK+1
      NRQ=0
C
C     CHECK PRINTER DESCRIPTIONS
      NI=IH*IV
      IF(NI)601,601,122
  601 JC(16)=1
      WRITE (ISOUT,31)
C
C 122  WRITE  A LOCAL HEADING
  122 WRITE (ISOUT,23)NTASK
      WRITE (ISOUT,24)XMIN,XMAX,YMIN,YMAX,DGX,DGY
      WRITE (ISOUT,25)(JC(J),J=1,18)
      WRITE (ISOUT,4)  GRUFF
      GO TO 1209
C
 1211 IF(JC(1).EQ.3) WRITE (MBTAPE)NUL,NUL
C
 1209 IF (FSUM.EQ.0.0) GO TO 1219
      WRITE (ISOUT,2) FSUM
C 1219 READ A REQUEST FOR PROCESSING
 1219 READ (ISIN,32)NREQ,T1,T2,MASCHN
      IF(MASCHN.EQ.0.AND.NREQ.NE.10)GO TO 1210
      IF(MASCHN.GT.71.AND.MASCHN.LT.162) GO TO 1210
      CALL ERROR(PROGRM,1209,ISOUT)
      MASCHN=95
 1210 DO 935 I=1,NMAP
  935 OMAP(I)=0.0
      DO 936 I=1,MARRAY
      X(I)=0.0
  936 Y(I)=0.0
      ICON=0
      MAPRUN=0
      NRQ=NRQ+1
      FSUM = 0.0
      NTAPES=NTAPET
      DO 937 I=1,NTAPET
  937 IOT(I)=ITT(I)
C
C     IS NREQ AN ACCEPTABLE REQUEST
C     NO TO 1215
```

```
      IF(NREQ)1212,1212,1213
 1213 IF(NREQ-MXREQ)1214,1214,1215
 1215 WRITE (ISOUT,33)NREQ
      GO TO 1202
C
C     MXREQ IS MAXIMUM NUMBER OF CALCULATION CODES ALLOWED FOR IN CALC.
C 1212 NO MORE REQUESTS. PREPARE TO RETURN TO READ LOCAL DATA.
 1212 CONTINUE
      GO TO 119
 1214 IPOUT=JPOUT
      REWIND IPOUT
      READ(IPOUT)TST
      READ (IPOUT)(TST,J=1,15)
      READ(IPOUT)(DETID(J),J=1,12),(DETID(J),J=1,12),(DETID(J),J=1,12),
     1(DETID(J),J=1,12),(DETID(J),J=1,12)
      READ(IPOUT)NPS
      READ(IPOUT)(TST,TST,TST,TST,J=1,NPS)
      READ(IPOUT)(DETID(J),J=1,12)
      IF(NRQ-1)1221,1222,1221
 1221 WRITE (ISOUT,3)
 1222 WRITE (ISOUT,34)NRQ,NREQ,T1,T2,MASCHN
      RUFSAM = SSAM/GRUFF
      JGO=1
      ITAB=NPS
      FISNUM=FW*1.45E15
      IF(NREQ.EQ.15.OR.NREQ.EQ.16) GO TO 1223
      T1=TIMSEC(T1,3,0)
      T2=TIMSEC(T2,3,0)
 1223 TIME=T1-TGZ
      TENTER=TIME
      TEXIT=T2-TGZ
      JD=.TRUE.
      KDOS=.FALSE.
      GO TO (80,81,79,78,62,80,80,82,78,83,80,80,80,80,80,81,80,80,80,80
     1),NREQ
 81   TIME=3600.0
      GO TO 79
 82   KDOS=.TRUE.
      GO TO 78
 83   JGO=2
      FISNUM=FISNUM*1.E+4
      RUFSAM=SSAM
      GO TO 79
 78   JD=.FALSE.
      FISNUM=FISNUM/3600.
 79   CALL PAM2
 80   IF (JC(14))801,1211,801
C
C     INITIALIZE FOR PROCESSING
 801  ICTR=0
      BZ2=BZ*0.5
      BZ22=BZ2*BZ2
C
C     IS USE OF DIFFUSION MODEL REQUESTED.  YES TO 1218
      IF(JC(15))1217,1217,1218
C
C1218 ADJUST BUFFER ZONE WIDTH TO ALLOW FOR FORTHCOMING DIFFUSIVE GROWTH
C     OF CLOUD SUBDIVISIONS.
 1218 BZ2=BZ2*DIFADJ
 1217 IF (NRQ.NE.1) GO TO 140
```

```
C1217 IS A GRID INTERVAL ADJUSTMENT PERMITTED     YES TO 130
      IF(JC(18)-1)130,131,130
C
C     NO ADJUSTMENT PERMITTED OPTION
 131  NBZX=-1
      NBZY=-1
      NBZX2=BZ2/DGX+1.0
 1311 TST=NBZX2
      BZ2=TST*DGX
C     THE BUFFER ZONE IS NOW AN INTEGRAL NUMBER OF GRID INTERVALS WIDE
      GO TO 140
C
C 130   IS AN UNDISTORTED MAP DESIRED    YES TO 1302
 130  IF(JC(16))1301,1302,1301
 1302 DISY=IV
      DISX=IH
      RD=2.0*DISY/DISX
      DISX=RD*DGY
      IF(DISX-DGX)1303,1304,1304
 1303 DGX=DISX
 1304 DGY=DGX/RD
      GO TO 131
 1301 IF(JC(15).GT.0 ) GO TO 131
C
C     EFFICIENCY ADJUSTMENT
      NBZX=BZ/DGX
      TST=NBZX
      TST=TST*DGX
      IF(BZ-TST)133,1341,1361
 1361 IF(NBZX)133,136,134
 136  NBZX=-1
      NBZX2=1
      GO TO 137
 133  IRROR=-133
      GO TO 333
C
C 134 ADJUST DGX TO MAKE BZ AN INTEGRAL MULTIPLE OF IT.
 134  NBZX=NBZX+1
      TST=NBZX
      DGX=BZ/TST
 1341 NBZX2=(NBZX+1)/2
C
C     NOW FOR THE Y DIMENSION
 137  NBZY=BZ/DGY
      TST=NBZY
      TST=TST*DGY
      IF(BZ-TST) 135,1311,1371
 1371 IF(NBZY)135,138,139
 135  IRROR=-135
      GO TO 333
 138  NBZY=-1
      GO TO 1311
 139  NBZY=NBZY+1
      TST=NBZY
      DGY=BZ/TST
      GO TO 1311
C
 140  XO=XMIN-BZ2
      YO=YMIN-BZ2
      XF=XMAX+BZ2
```

```
      YF=YMAX+BZ2
C
C     PREPARE TO PROCESS OUTPUT
C*******CALCULATE NUMBER OF ZONES BEYOND FIRST NEEDED IN SORTING
      NYMAP = (YMAX - YMIN)/DGY
      NXMAP=(XF-XO)/DGX
      NST = NMAP/NYMAP
      IF(NXMAP-NST) 1503,1503,1402
 1402 NXMAP=NST
      XMAP=NXMAP
      ZZ=(XF-XO)/(XMAP*DGX)
      NZ=ZZ
      TST=NZ
      IF(ZZ-TST) 1500,1501,1401
 1500 IRROR=-1500
      GO TO 333
 1501 NZ=NZ-1
      GO TO 1401
 1503 NZ=0
C
C******** END OF ZONE CALCULATION
 1401  NOX=NXMAP-NBZX2-NBZX2
      IF(NOX)1403,1403,1404
 1403 IRROR=-1403
 333  CALL ERROR (PROGRM,IRROR,ISOUT)
      GO TO 1211
 1404 OX=NOX
      DELTAX=OX*DGX
C
 1502 WRITE (ISOUT,27)DGX,DGY
C
      X1=XO
      X2=X1+BZ2
      X3=X2+DELTAX
      X4=X3+BZ2
 300  IF(NZ-NTAPES) 200,200,201
 200  MIN=NZ
      LAST=0
      GO TO 202
 201  MIN=NTAPES
      LAST=1
 202  JIN=2*MIN
      IF(NZ)203,204,205
 203  IRROR=-203
      GO TO 333
 204  CALL RUN1
      CALL MAP
      GO TO 1211
 205  IF(LAST)206,207,209
 206  IRROR=-206
      GO TO 333
 207  CALL LFTSGO
      ICTR=1
      DO 208 INDEX=1,MIN
      CALL MAP
      IPOUT=IOT(INDEX)
      X1=X3
      X2=X4
      X3=X4+DELTAX
      X4=X3+BZ2
```

```
      CALL SLIDE                                                        LNK9 324
      CALL RUN1                                                         LNK9 325
  208 REWIND IPOUT                                                      LNK9 326
      CALL MAP                                                          LNK9 327
      GO TO 1211                                                        LNK9 328
  209 CALL LETSGO                                                       LNK9 329
      KIN2=IPOUT                                                        LNK9 330
      ICTR=1                                                            LNK9 331
      KIN=MIN-1                                                         LNK9 332
      DO 210 INDEX=1,KIN                                                LNK9 333
      CALL MAP                                                          LNK9 334
      IPOUT=IOT(INDEX)                                                  LNK9 335
      X1=X3                                                             LNK9 336
      X2=X4                                                             LNK9 337
      X3=X4+DELTAX                                                      LNK9 338
      X4=X3+BZ2                                                         LNK9 339
      CALL SLIDE                                                        LNK9 340
      CALL RUN1                                                         LNK9 341
  210 REWIND IPOUT                                                      LNK9 342
      CALL MAP                                                          LNK9 343
      IPOUT=IOT(MIN)                                                    LNK9 344
      IF(ICON)2111,2112,2111                                            LNK9 345
 2112 NTAPES=NTAPES-1                                                   LNK9 346
      ICON=1                                                            LNK9 347
      GO TO 2113                                                        LNK9 348
 2111 IOT(MIN)=KIN2                                                     LNK9 349
 2113 REWIND IPOUT                                                      LNK9 350
      NZ=NZ-MIN                                                         LNK9 351
      X1=X3                                                             LNK9 352
      X2=X4                                                             LNK9 353
      X3=X2+DELTAX                                                      LNK9 354
      X4=X3+BZ2                                                         LNK9 355
      CALL SLIDE                                                        LNK9 356
      GO TO 300                                                         LNK9 357
      END                                                               LNK9 358
$IBFTC CALCX   LIST,DECK,M94/2                                          CALC   0
      SUBROUTINE CALC                                                   CALC   1
C     P: FLUSSER  TECHNICAL OPERATIONS RESEARCH  SP  CALC               CALC   2
C     26  FEB  67                                                       CALC   3
C*** THIS SUBROUTINE DETERMINES WHAT OUTPUT IS REQUESTED AND            CALC   4
C*** COMPUTES THE FINAL RESULTS.  THESE IT STORES IN AN ARRAY CALLED    CALC   5
C****     OMAP.                                                         CALC   6
C                                                                       CALC   7
C ***********************************************************************CALC   8
C                                                                       CALC   9
      COMMON /SET1/                                                     CALC  10
     1         DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT   ,   CALC  11
     2         SD     , SPAR   , SSAM   , THE    , TMP1   , TMP2    ,   CALC  12
     3         T2M    , U      , VPR    , W      , HBURST , SCLDHB  ,   CALC  13
     4         TID(40), RMIN   , IDISTR , SPAR1  , MBTAPE , FSUM    ,   CALC  14
     5         RUFSAM , SPAR5  , SPAR6  , XGZ    , YGZ    , TGZ         CALC  15
      COMMON  /SET3/                                                    CALC  16
     1    BZ             ,BZ2            ,BZZ            ,BZ22          CALC  17
     2   ,DELTAX         ,DGX            ,DGY            ,DIFCON        CALC  18
     3   ,DIFADJ         ,FMAS(500)      ,FMASS(200)     ,IC(18)        CALC  19
     4   ,ICON           ,ICTR           ,IH             ,IOT(18)       CALC  20
     5   ,IP             ,IPOUT          ,ITT(18)        ,IV            CALC  21
     6   ,JC(18)         ,JIN            ,JOUT           ,JPOUT         CALC  22
     7   ,KTR(500)       ,KTAPE          ,LAST           ,MAPRUN        CALC  23
     8   ,MARRAY         ,MIN            ,MXREQ                         CALC  24
```

```
     9    ,N              ,NA             ,NBZX           ,NBZX2
     1    ,NBZY           ,NCL            ,NE             ,NF
     2    ,NIJ            ,NMAP           ,NMAX           ,NOX
     3    ,NP(21)         ,NREQ           ,NS             ,NTAPES
     4    ,NTAPET         ,NTASK          ,NXMAP          ,NYMAP
     5    ,YMIN           ,PS(500)        ,PSIZE(200)     ,PACT(200)
     6    ,ROPART                         ,T(500)         ,T1
     7    ,T2             ,TLIMIT         ,X(500)         ,XF
     8    ,X0             ,XMAX           ,XMIN           ,XNMAP
     9    ,X1             ,X2             ,X3             ,X4
     1    ,Y(500)         ,YF             ,Y0             ,YMAX
      COMMON/DECAY/
     1     IGO        ,JD          ,KDOS        ,TENTER
     2    ,TEXIT      ,TIME
C
      COMMON/OUTPUT/
     1     FISNUM     ,FP    (200) ,FW          ,ITAB        ,JGO
     2    ,MASCHN     ,SIGMAS
      COMMON /SET4/  OMAP(4000)
C
C **********************************************************************
C
 210  FORMAT(8H0FORMULA,I6,67H IS UNAVAILABLE. COMPUTATION WAS CONTINUED
     1FOR A REQUEST OF TYPE 1.)
C
C **********************************************************************
C **********************************************************************
C
C
      DATA PROGRM/6H CALC /
C
      ASSIGN 213 TO NORD
      GO TO(101,102,103,104,105,106,107,102,102,102,112,113,114,115,116
     1,117,109,110,111,120),NREQ
C
C 101  COUNT OF GROUNDED WAFERS
  101 F=1.0
      GO TO 100
C
C 103  DOSE RATE AT TIME H+T1 SECONDS
 103  IF(T(IP) -T1)102,102,777
C
C 104 DOSE ACCUMULATED FROM TIME H+T1 SECONDS TO INFINITY
 104  IF(T(IP)-T1)1041,1041,1042
 1041 TENTER=T1 -TGZ
      GO TO  130
 1042 TENTER=T(IP) -TGZ
      GO TO 130
C
C 105  DOSE ACCUMULATED FROM TIME H+T1 TO TIME H+T2 SECONDS
 105  IF(T(IP)-T2)1051,777,777
 1051 IF(T(IP)-T1)1052,1052,1053
 1052 TENTER=T(IP)-TGZ
      GO TO  130
 1053 TENTER=T1 -TGZ
      GO TO 130
C
C 106 TOTAL PARTICLE MASS DEPOSITED
 106  F=FMAS(IP)
      GO TO 100
```

```
C
C 107 TOTAL PARTICLE MASS DEPOSITED BETWEEN TIMES T1 AND T2 SECONDS
 107  IF(T(IP)-T2)1071,777,777
 1071 IF(T(IP)-T1)777,777,106
 130  CALL PAM2
C
C 102 FIND INDEX OF PARTICLE SIZE CLASS
 102  DO 131 J=1,ITAB
      IF(PACT(J).LE.PS(IP))GO TO 132
 131  CONTINUE
      CALL ERROR(PROGRM,131,ISOUT)
      GO TO 777
C
 132  IPS=J
      F=FP(IPS)*FMAS(IP)/(FMASS(IPS)*RUFSAM)
      GO TO 100
C
C 112 TIME OF ARRIVAL
 112  ASSIGN 211 TO NORD
 1121 F= T(IP)
      GO TO 100
C
C 113 TIME OF CESSATION
 113  ASSIGN 212 TO NORD
      GO TO 1121
C
C 114 SMALLEST PARTICLE SIZE
 114  ASSIGN 211 TO NORD
 1141 F= PS(IP)
      GO TO 100
C
C 115 LARGEST PARTICLE SIZE
 115  ASSIGN 212 TO NORD
      GO TO 1141
C
C 116 MASS FROM PARTICLES IN THE SIZE RANGE T1 TO T2 MICRONS.
 116  IF(PS(IP).GE.T1.AND.PS(IP).LE.T2)  GO TO 106
      GO TO 777
C
C 117 H+1 HR NORMALIZED DOSE RATE RESULTING FROM PARTICLES IN THE SIZE
C     RANGE T1 TO T2 MICRONS
 117  IF(PS(IP).GE.T1.AND.PS(IP).LE.T2)  GO TO 102
      GO TO 777
C
C
C************************ CODE INSERTION POINTS ************************
  109 CONTINUE
 110  CONTINUE
 111  CONTINUE
C************************ CODE INSERTION POINTS ************************
C
 120  CONTINUE
      WRITE (ISOUT,210)NREQ
      NREQ=1
      GO TO 101
  100 CONTINUE
C
C     CALCULATE WAFER BOUNDARIES
      IF(JC(15))1001,1001,1002
 1002 CALL DIFUZ1(RZ2)
```

```
      F=F* BZ22/(RZ2**2)
      GO TO 1003
 1001 RZ2=BZ/2.0
 1003 WXL=X(IP)-RZ2
      WYT=Y(IP)+RZ2
      WYB=Y(IP)-RZ2
      WXR=X(IP)+RZ2
C
C     DOES WAFER (PARTIALLY) FALL IN LEFT BUFFER ZONE...
      IF(X(IP)-X2)2,3,3
C     2=YES,ADJUST LEFT BOUNDARY AND SET NOL
 2    WXL=X2
      NOL=1+NBZX2
      GO TO 7
C     3=NO,COMPUTE NOL
C
C     NOL=SMALLEST X - INDEX OF ANY GRID PT. WITHIN WAFER
 3    NOL=(WXL-X1)/DGX+1.0
C
C     DOES WAFER (PARTIALLY) FALL OUTSIDE RIGHT BUFFER ZONE
      IF(WXR-X4)4,4,6
C     4=NO,CHECK IF GRID INTERVALS WERE ADJUSTED
 4    IF(NBZX+1)5,7,9
C     5=ERROR
 5    IRROR=5
      GO TO 333
 6    WXR=X4+.01*DGX
 7    JX=(WXR-X1)/DGX+1.0
      NWX=JX-NOL
C
C     ARE THERE OUTPUT PTS TO BE CONSIDERED
      IF(NWX)777,777,10
 9    NWX=NBZX
C     NWX=NO. OF GRID PTS. COVERED BY WAFER IN X DIRECTION
C
C     DOES WAFER (PARTIALLY) FALL IN LOWER BUFFER ZONE...
 10   IF(WYB-YMIN)11,12,12
C 11=YES. ADJUST LOWER BOUNDARY AND SET NOB
 11   WYB=YMIN
      NOB=1
      GO TO 16
C  12=NO,COMPUTE NOB
C     NOB=SMALLEST Y - INDEX OF ANY GRID PT WITHIN WAFER
 12   NOB=(WYB-YMIN)/DGY+1.0
C
C     DOES WAFER (PARTIALLY FALL IN UPPER BUFFER ZONE
      IF(WYT-YMAX)13,13,15
C  13=NO,CHECK IF GRID INTERVALS WERE ADJUSTED
 13   IF(NBZY+1)14,16,18
C  14=ERROR
 14   IRROR=14
      GO TO 333
   15 WYT=YMAX
   16 JY=(WYT-YMIN)/DGY+1.0
C     NWY=NO. OF GRID PTS. COVERED BY WAFER IN Y-DIRECTION
      NWY=JY-NOB
C
C     ARE THERE OUTPUT POINTS TO BE CONSIDERED
      IF(NWY)777,777,19
   18 NWY=NBZY
```

```
C                                                                       CALC 205
C  19=YES. COMPUTE WAFER CONTRIBUTION                                   CALC 206
C                                                                       CALC 207
   19 K=NOL+(NOB-1)*NXMAP                                               CALC 208
      NM=K+(NWY-1)*NXMAP                                                CALC 209
      NN=NWX-1                                                          CALC 210
      DO 20 J=K,NM,NXMAP                                                CALC 211
      JJ=NN+J                                                           CALC 212
      DO 20 I=J,JJ                                                      CALC 213
      OMA=OMAP(I)                                                       CALC 214
      GO TO NORD, (211,212,213)                                         CALC 215
  211 IF(OMA.EQ.0.0) GO TO 213                                          CALC 216
      OMAP(I)=AMIN1 (OMA,F)                                             CALC 217
      GO TO 20                                                          CALC 218
  212 OMAP(I)=AMAX1(OMA,F)                                              CALC 219
      GO TO 20                                                          CALC 220
  213 OMAP(I)=OMAP(I)+F                                                 CALC 221
  20  CONTINUE                                                          CALC 222
  777 RETURN                                                            CALC 223
  333 CALL ERROR (PROGRM,IRROR,ISOUT)                                   CALC 224
C                                                                       CALC 225
      STOP                                                              CALC 226
      END                                                               CALC 227
$IBFTC COUN    LIST,DECK,M94/2                                          COUN   0
      SUBROUTINE COUNT                                                  COUN   1
C     26  FEB  67                                                       COUN   2
C     P. FLUSSER  TECHNICAL OPERATIONS RESEARCH  SR  COUNT              COUN   3
C***SUBROUTINE COUNT COMPUTES                                           COUN   4
C***   JOUT         THE MOST DENSELY POPULATED REGION                   COUN   5
C***   NS           THE NUMBER OF PARTICLE PARAMETRS TO BE WRITTEN OUT  COUN   6
C***  KTAPE         THE TAPE NUMBER ON WHICH THESE PARTICLE PARAMETER   COUN   7
C***   ARE TO BE WRITTEN OUT.                                           COUN   8
C                                                                       COUN   9
C ***********************************************************************COUN  10
C                                                                       COUN  11
      COMMON /SET1/                                                     COUN  12
     1        DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT    ,   COUN  13
     2        SD     , SPAR   , SSAN   , TME    , TMP1   , TMP2     ,   COUN  14
     3        T2M    , U      , VPR    , W      , HBURST , SCLDHB   ,   COUN  15
     4        TID(40), RMIN   , IDISTR , SPAR1  , MBTAPE , FSUM     ,   COUN  16
     5        SPAR4  , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9        COUN  17
      COMMON  /SET3/                                                    COUN  18
     1   BZ            ,BZ2            ,BZZ            ,BZ22            COUN  19
     2   ,DELTAX       ,DGX            ,DGY            ,DIFCON          COUN  20
     3   ,DIFADJ       ,FMAS(500)      ,FMASS(200)     ,IC(18)          COUN  21
     4   ,ICON         ,ICTR           ,IH             ,IOT(18)         COUN  22
     5   ,IP           ,IPOUT          ,ITT(18)        ,IV              COUN  23
     6   ,JC(18)       ,JIN            ,JOUT           ,JPOUT           COUN  24
     7   ,KTR(500)     ,KTAPE          ,LAST           ,MAPRUN          COUN  25
     8   ,MARRAY       ,MIN            ,MXREQ                           COUN  26
     9   ,N            ,NA             ,NBZX           ,NBZX2           COUN  27
     1   ,NBZY         ,NCL            ,NE             ,NF              COUN  28
     2   ,NIJ          ,NMAP           ,NMAX           ,NOX             COUN  29
     3   ,NP(21)       ,NREQ           ,NS             ,NTAPES          COUN  30
     4   ,NTAPET       ,NTASK          ,NXMAP          ,NYMAP           COUN  31
     5   ,YMIN         ,PS(500)        ,PSIZE(200)     ,PACT(200)       COUN  32
     6   ,ROPART                       ,T(500)         ,T1              COUN  33
     7   ,T2           ,TLIMIT         ,X(500)         ,XF              COUN  34
     8   ,X0           ,XMAX           ,XMIN           ,XNMAP           COUN  35
     9   ,X1           ,X2             ,X3             ,X4              COUN  36
```

```
     1    ,Y[500]         ,YF                 ,YO                 ,YMAX
      COMMON /SET4/  UMAP[4000]
C
C ******************************************************************
C
      DATA PROGRM/6HCOUNT /
C
C ******************************************************************
C ******************************************************************
C
      MAX=NP[1]+NP[2]
      JOUT=2
      IF (JIN.LT.4) GO TO 6
      DO 4 J=4,JIN,2
      IF[MAX-NP[J]] 3,4,4
    3 MAX=NP[J]
      JOUT=J
    4 CONTINUE
      IF[MAX-NP[1]-NP[2]]5,6,7
 5    CALL ERROR[PROGRM,-5,ISOUT]
    6 NS=MAX+NP[3]
      GO TO 8
    7 NS=NP[JOUT]+NP[JOUT+1]
    8 JJ = JOUT/2
      KTAPE=IOT[JJ]
      RETURN
      END
$IBFTC CRDPX   LIST,DECK,M94/2
      SUBROUTINE CRDP
C     P. FLUSSER  TECHNICAL OPERATIONS RESEARCH  SH  CRDP
C
C   26FEB 67
C***AFTER ALL THE PARTICLE PARAMETERS HAVE BEEN READ FROM TAPE
C***IPOUT, SUBROUTINE CRDP IS CALLED AND WRITES OUT THOSE
C***PARTICLE PARAMETERS THAT ARE LEFT IN CORE ON THE APPROPRIATE
C***TAPES.  IT LEAVES THOSE PARTICLES THAT FALL INTO THE ZONE
C***WHICH IS TO BE TREATED NEXT IN CORE AND SETS NIJ=-1 AS A
C***SIGNAL TO SUBSEQUENTLY CALLED SUBROUTINES TO TREAT THESE
C***PARTICLES BEFORE READING NEW ONES FROM TAPE.
C
C ******************************************************************
C
      COMMON /SET1/
     1          DIAM   ,DETID[12],IRISE  , IEXEC  , ISIN    , ISOUT    ,
     2          SD     , SPAR    , SSAM   , THE    , TMP1    , TMP2     ,
     3          T2M    , U       , VPR    , W      , HBURST  , SCLDHB   ,
     4          TID[40], RMIN    , IDISTR , SPAR1  , MBTAPE  , FSUM     ,
     5          SPAR4  , SPAR5   , SPAR6  , SPAR7  , SPAR8   , SPAR9
      COMMON  /SET3/
     1    BZ              ,BZ2               ,BZZ               ,BZ22
     2    ,DELTAX         ,DGX               ,DGY               ,DIFCON
     3    ,DIFADJ         ,FMAS[500]         ,FMASS[280]        ,IC[18]
     4    ,ICON           ,ICTR              ,IH                ,IOT[18]
     5    ,IP             ,IPOUT             ,ITT[18]           ,IV
     6    ,JC[18]         ,JIN               ,JOUT              ,JPOUT
     7    ,KTR[500]       ,KTAPE             ,LAST              ,MAPRUN
     8    ,MARRAY         ,MIN               ,MXREQ
     9    ,N              ,NA                ,NBZX              ,NBZX2
     1    ,NBZY           ,NCL               ,NE                ,NF
     2    ,NIJ            ,NMAP              ,NMAX              ,NOX
```

```
     3   ,NP(21)         ,NREQ          ,NS            ,NTAPES          CRDP  33
     4   ,NTAPET         ,NTASK         ,NXMAP         ,NYMAP           CRDP  34
     5   ,YMIN           ,PS(500)       ,PSIZE(200)    ,PACT(200)       CRDP  35
     6   ,ROPART                        ,T(500)        ,T1              CRDP  36
     7   ,T2             ,TLIMIT        ,X(500)        ,XF              CRDP  37
     8   ,XO             ,XMAX          ,XMIN          ,XNMAP           CRDP  38
     9   ,X1             ,X2            ,X3            ,X4              CRDP  39
     1   ,Y(500)         ,YF            ,YO            ,YMAX            CRDP  40
      COMMON /SET4/  OMAP(4000)                                         CRDP  41
C                                                                       CRDP  42
C ***********************************************************************CRDP  43
C                                                                       CRDP  44
C                                                                       CRDP  45
C ***********************************************************************CRDP  46
C ***********************************************************************CRDP  47
C                                                                       CRDP  48
      K=JIN-2                                                           CRDP  49
C*** IS LAST ZONE SORTED... IF YES, WRITE OUT ALL ZONES,                CRDP  50
C***IF NOT, TREAT LAST ZONE DIFFERENTLY.                                CRDP  51
      IF(LAST) 50,50,51                                                 CRDP  52
   50 K=K+2                                                             CRDP  53
 51   IF(K.LT.2) GO TO 52                                               CRDP  54
      DO 1 J=2,K,2                                                      CRDP  55
      JOUT=J                                                            CRDP  56
      JJ=J/2                                                            CRDP  57
      KTAPE=IOY(JJ)                                                     CRDP  58
      IF(J-2)31,2,31                                                    CRDP  59
 31   NS=NP(J)+NP(J+1)                                                  CRDP  60
      IF(NS) 2,2,3                                                      CRDP  61
    3 CALL SHIFT                                                        CRDP  62
    2 L=0                                                               CRDP  63
      WRITE (KTAPE)L                                                    CRDP  64
    1 REWIND KTAPE                                                      CRDP  65
C***  IS LAST ZONE WRITTEN OUT...                                       CRDP  66
 52   IF(LAST) 8,10,8                                                   CRDP  67
C***    CAN WE DUMP ALL PARTICLES NOW...                                CRDP  68
    8 IF(NP(JIN)-NMAX) 5,5,6                                            CRDP  69
    6 NS=NMAX                                                           CRDP  70
      NP(JIN)=NP(JIN)-NS                                                CRDP  71
      GO TO 7                                                           CRDP  72
    5 NS=NP(JIN)                                                        CRDP  73
    7 JOUT=JIN                                                          CRDP  74
      KTAPE=IOT(MIN)                                                    CRDP  75
      IF(NS)9,9,71                                                      CRDP  76
 71   CALL SHIFT                                                        CRDP  77
C***ARE ANY PARTICLES LEFT...                                           CRDP  78
      IF(NP(JIN)) 9,9,8                                                 CRDP  79
    9 L=0                                                               CRDP  80
      WRITE (KTAPE)L                                                    CRDP  81
      REWIND KTAPE                                                      CRDP  82
   10 NIJ=-1                                                            CRDP  83
      RETURN                                                            CRDP  84
      END                                                               CRDP  85
$IBFTC DIFUX1  LIST,DECK,M94/2                                          DIFU   0
      SUBROUTINE DIFUZ1(RZ2)                                            DIFU   1
C     T.W. SCHWENKE    TECHNICAL OPERATIONS RESEARCH                    DIFU   2
C     11 OCT   66                                                       DIFU   3
C                                                                       DIFU   4
C     THIS SUBROUTINE EXPANDS THE CLOUD SUBDIVISIONS AS A MEANS OF      DIFU   5
C     APPROXIMATING THE EFFECTS OF ATMOSPHERIC DIFFUSION.               DIFU   6
```

```
C
C ***********************************************************************
C
      COMMON /SET1/
     1         DIAM    ,DETID(12),IRISE  , IEXEC   , ISIN    , ISOUT     ,
     2         SD      , SPAR    , SSAM   , TME     , TMP1    , TMP2      ,
     3         T2M     , U       , VPR    , W       , HBURST  , SCLDHB    ,
     4         TID(40), RMIN    , IDISTR , SPAR1   , MBTAPE  , FSUM      ,
     5         SPAR4   , SUBRAD  , RADMAX , XGZ     , YGZ     , TGZ
C
C ***********************************************************************
C
      COMMON  /SET3/
     1     BZ              ,BZ2              ,BZZ              ,BZ22
     2    ,DELTAX          ,DGX              ,DGY              ,DIFCON
     3    ,DIFADJ          ,FMAS(500)        ,FMASS(200)       ,IC(18)
     4    ,ICON            ,ICTR             ,IH               ,IOT(18)
     5    ,IP              ,IPOUT            ,ITT(18)          ,IV
     6    ,JC(18)          ,JIN              ,JOUT             ,JPOUT
     7    ,KTR(500)        ,KTAPE            ,LAST             ,MAPRUN
     8    ,MARRAY          ,MIN              ,MXREQ
     9    ,N               ,NA               ,NBZX             ,NBZX2
     1    ,NBZY            ,NCL              ,NE               ,NF
     2    ,NIJ             ,NMAP             ,NMAX             ,NOX
     3    ,NP(21)          ,NREQ             ,NS               ,NTAPES
     4    ,NTAPET          ,NTASK            ,NXMAP            ,NYMAP
     5    ,YMIN            ,PS(500)          ,PSIZE(200)       ,PACT(200)
     6    ,ROPART                            ,T(500)           ,T1
     7    ,T2              ,TLIMIT           ,X(500)           ,XF
     8    ,XO              ,XMAX             ,XMIN             ,XNMAP
     9    ,X1              ,X2               ,X3               ,X4
     1    ,Y(500)          ,YF               ,YO               ,YMAX
C
C ***********************************************************************
C
      COMMON /SET4/  OMAP(4000)
C
C ***********************************************************************
C
C     THE VARIABLE DIFCON HOLDS AT THIS POINT THE PRODUCT  3.0*DIFCON
C     WHERE DIFCON ORIGINALLY WAS PUT IN AS AN ATMOSPHERIC DIFUSION
C     CONSTANT.
C     BZ22 HAS THE SQUARE OF BZ/2.0 ,THE WIDTH OF THE CLOUD SUBDIVISION.
C
 1    FORMAT(53H DIFFUSIVE GROWTH OF CLOUD SUBDIVISIONS IS EXCESSIVE.,3X
     1,3HX= F11.3,3HY= F11.3)
C
C ***********************************************************************
C ***********************************************************************
C
      DATA NGOOF /0/
C
      RZ2=SQRT(DIFCON*(T(IP)-TGZ)+BZ22)
      IF(RZ2 .LE.BZ2)  RETURN
      RZ2=BZ2
      NGOOF=NGOOF+1
      IF(NGOOF .GT.0 .AND.NGOOF  .LT.50) WRITE(ISOUT,1)X(IP),Y(IP)
      RETURN
      END
$IBFTC LETSG   LIST,DECK,M94/2
```

```
      SUBROUTINE LETSGO
C     26  FEB  67
C     P. FLUSSER  TECHNICAL OPERATIONS RESEARCH  SR  LETSGO
C
C*** THIS SUBROUTINE READS THE PARTICLE PARAMETERS FROM TAPE IPOUT
C*** AND CALLS THE APPROPRIATE SUBROUTINES TO PROCESS THEM.
C*** SUBROUTINES CALLED BY LETSGO....
C***PROC,ZERO,COUNT,SHIFT,CRDP.
C***NE= NUMBER OF EMPTY SPACES.
C*** MARRAY= DUMENSION OF PARTICLE ARRAY
C*** NP(I)= NUMBER OF PARTICLES FALLING IN ITH ZONE
C*** KTR(I)= ZONE INDENTIFICATION NUMBER OF ITH PARTICLE
C*** NIJ= NO. OF PARTICLES IN NECT DATA BLOCK.
C
C ************************************************************************
C
      COMMON /SET1/
     1          DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2          SD     , SPAR   , SSAM   , THE    , TMP1   , TMP2     ,
     3          T2M    , U      , VPR    , W      , HBURST , SCLDHB   ,
     4          TID(40), RMIN   , IDISTR , SPAR1  , MBTAPE , FSUM     ,
     5          SPAR4  , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9
      COMMON  /SET3/
     1    BZ              ,BZ2             ,BZZ             ,BZ22
     2   ,DELTAX          ,DGX             ,DGY             ,DIFCON
     3   ,DIFADJ          ,FMAS(500)       ,FMASS(200)      ,IC(18)
     4   ,ICON            ,ICTR            ,IH              ,IOT(18)
     5   ,IP              ,IPOUT           ,ITT(18)         ,IV
     6   ,JC(18)          ,JIN             ,JOUT            ,JPOUT
     7   ,KTR(500)        ,KTAPE           ,LAST            ,MAPRUN
     8   ,MARRAY          ,MIN             ,MXREQ
     9   ,N               ,NA              ,NBZX            ,NBZX2
     1   ,NBZY            ,NCL             ,NE              ,NF
     2   ,NIJ             ,NMAP            ,NMAX            ,NOX
     3   ,NP(21)          ,NREQ            ,NS              ,NTAPES
     4   ,NTAPET          ,NTASK           ,NXMAP           ,NYMAP
     5   ,YMIN            ,PS(500)         ,PSIZE(200)      ,PACT(200)
     6   ,ROPART                           ,T(500)          ,T1
     7   ,T2              ,TLIMIT          ,X(500)          ,XF
     8   ,XO              ,XMAX            ,XMIN            ,XNMAP
     9   ,X1              ,X2              ,X3              ,X4
     1   ,Y(500)          ,YF              ,YO              ,YMAX
      COMMON /SET4/  OMAP(4000)
C
C ************************************************************************
C
      DATA PROGRM/6HLETSGO/
C
C ************************************************************************
C ************************************************************************
C
      NE=MARRAY
      K=JIN+1
      DO 2 I=1,K
    2 NP(I)=0
      DO 3 I=1,MARRAY
    3 KTR(I)=0
      ASSIGN 100 TO NSN
    4 READ (IPOUT)NIJ
C*** ARE WE DONE... 0=YES, 9=NO.
```

```
      IF(NIJ) 5,8,9
 5    IRROR=-5
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)
C***DUMP AND RETURN
    8 CALL CRDP
      GO TO 18
    9 IF(NIJ-MARRAY) 11,11,10
 10   IRROR=-10
      GO TO 7734
C*** IS THERE ENOUGH ROOM TO READ NEXT DATA BLOCK...
C*** 12= YES, PROCEED, SHIFTING ZEROS IF NECESSARY.
   11 IF(NIJ-NE) 12,12,15
   12 GO TO NSN,(100,200)
  100 ASSIGN 200 TO NSN
C*** 13= READ PARTICLE PARAMETERS DECREMENT EMPTY SPACES, PROCESS
C***PARTICLES READ IN AND READ NUMBER OF PARTICLES IN NEXT
C*** DATA BLOCK.
   13 READ (IPOUT)(X(I),Y(I),T(I),PS(I),FMAS(I),I=1,NIJ)
      NE=NE-NIJ
      CALL PROC
      GO TO 4
  200 CALL ZERO
      GO TO 13
   15 CALL COUNT
      CALL SHIFT
      GO TO 11
   18 RETURN
      END
$IBFTC MAPX    LIST,DECK,M94/2
      SUBROUTINE MAP
C     26  FEB  67
C     T.W.SCHWENKE   TECHNICAL OPERATIONS RESEARCH   SR MAP
C
C ***********************************************************************
C
      COMMON /SET1/
     1         DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT  ,
     2         SD     , SPAR   , SSAM   , THE    , TMP1   , TMP2   ,
     3         T2M    , U      , VPR    , W      , HBURST , SCLDHB ,
     4         TID(40), RMIN   , IDISTR , SPAR1  , MBTAPE , FSUM   ,
     5         SPAR4  , SPAR5  , SPAR6  , XGZ    , YGZ    , TGZ
      COMMON  /SET3/
     1    BZ             ,BZ2           ,BZZ           ,BZ22
     2   ,DELTAX         ,DGX           ,DGY           ,DIFCON
     3   ,DIFADJ         ,FMAS(500)     ,FMASS(200)    ,IC(18)
     4   ,ICON           ,ICTR          ,IH            ,IOT(18)
     5   ,IP             ,IPOUT         ,ITT(18)       ,IV
     6   ,JC(18)         ,JIN           ,JOUT          ,JPOUT
     7   ,KTR(500)       ,KTAPE         ,LAST          ,MAPRUN
     8   ,MARRAY         ,MIN           ,MXREQ
     9   ,N              ,NA            ,NBZX          ,NBZX2
     1   ,NBZY           ,NCL           ,NE            ,NF
     2   ,NIJ            ,NMAP          ,NMAX          ,NOX
     3   ,NP(21)         ,NREQ          ,NS            ,NTAPES
     4   ,NTAPET         ,NTASK         ,NXMAP         ,NYMAP
     5   ,YMIN           ,PS(500)       ,PSIZE(200)    ,PACT(200)
     6   ,ROPART                        ,T(500)        ,T1
     7   ,T2             ,TLIMIT        ,X(500)        ,XF
     8   ,X0             ,XMAX          ,XMIN          ,XNMAP
     9   ,X1             ,X2            ,X3            ,X4
```

```
     1   ,Y(500)         ,YF              ,YO             ,/MAX            MAPX
      COMMON /SET4/  OMAP(4000)                                            MAPX
      COMMON/OUTPUT/                                                       MAPX
     1    FISNUM      ,FP    (200) ,FW          ,ITAB       ,JGO           MAPX
     2   ,MASCHN      ,SIGMAS                                              MAPX
      DIMENSION JMAP(20)                                                   MAPX
C                                                                          MAPX
C *************************************************************************MAPX
C                                                                          MAPX
 1    FORMAT(1H1,5HSTRIP I3)                                               MAPX
 2    FORMAT(/1X,19I6)                                                     MAPX
 3    FORMAT(15X21HTWO-LINE E FORMAT MAP)                                  MAPX
 4    FORMAT(3X,19F6.3)                                                    MAPX
 5    FORMAT(15X26HTWO-LINE F11.3 FORMAT MAP.)                             MAPX
 6    FORMAT(16H0DISPLAY METHOD I4,33H IS NOT AVAILABLE. USED METHOD 1.)MAPX
 7    FORMAT(//15X,28HTHE OUTPUT PRESENTATION IS A)                        MAPX
 8    FORMAT(//15X,25HTHE QUANTITY PRESENTED IS)                           MAPX
 9    FORMAT(15X,27HA COUNT OF GROUNDED WAFERS.)                           MAPX
 10   FORMAT(15X,38HDOSE RATE NORMALIZED TO TIME H+1 HOUR.)                MAPX
 11   FORMAT(15X,20HDOSE RATE AT TIME H+F10.1,9H SECONDS.)                 MAPX
 12   FORMAT(15X,32HDOSE ACCUMULATED BETWEEN TIME H+F10.1,22H SECONDS ANMAPX
     1D INFINITY.)                                                         MAPX
 13   FORMAT(15X,32HDOSE ACCUMULATED BETWEEN TIME H+F10.1,12H AND TIME HMAPX
     1+F10.1,9H SECONDS.)                                                  MAPX
 14   FORMAT(15X,34HTOTAL MASS OF DEPOSITED PARTICLES.)                    MAPX
 15   FORMAT(15X,44HTOTAL PARTICLE MASS DEPOSITED BETWEEN TIMES F10.1,5HMAPX
     1 AND F10.1,9H SECONDS.)                                              MAPX
 16   FORMAT(/1X,F7.0,3X,2(10X,5H*****,F12.0,3X),20X,5H*****,/)            MAPX
 17   FORMAT(15X,41HASSUMES ALL PARTICLES ARE GROUNDED BY T1.)             MAPX
 18   FORMAT(15X,17HACTIVITY AT TIME F10.1,19H DUE TO MASS CHAIN I4)       MAPX
 19   FORMAT(15X,26HMULTIPLE BURST BINARY TAPE)                            MAPX
 20   FORMAT(15X,31HGROUND ZERO IS LOCATED AT  X = F10.1,8H  , Y = F10.1MAPX
     1)                                                                    MAPX
 21   FORMAT(1H1,41X,36HY-COORDINATE SCALES FOR SIDES OF MAP/1H0)          MAPX
 22   FORMAT(//1X,F13.0,82X,F13.0)                                         MAPX
 23   FORMAT(15X,46HTIME (SECONDS) OF ONSET OF FALLOUT DEPOSITION.)        MAPX
 24   FORMAT(15X,50HTIME (SECONDS) OF CESSATION OF FALLOUT DEPOSITION.)    MAPX
 25   FORMAT(15X,50HDIAMETER (MICRONS) OF SMALLEST DEPOSITED PARTICLE.)    MAPX
 26   FORMAT(15X,49HDIAMETER (MICRONS) OF LARGEST DEPOSITED PARTICLE.)     MAPX
 27   FORMAT(15X,58HMASS DEPOSITED (KGM/M**2) BY PARTICLES IN THE SIZE RMAPX
     1ANGE  ,F12.5,4H TO ,F12.5, 9H MICRONS.)                              MAPX
 28   FORMAT(15X,73HH+1 HOUR NORMALIZED DOSE RATE RESULTING FROM PARTICLMAPX
     1ES IN THE SIZE RANGE ,F12.5,4H TO ,F12.5,9H MICRONS.)                MAPX
C                                                                          MAPX
C *************************************************************************MAPX
C *************************************************************************MAPX
C                                                                          MAPX
      DATA BITLUM,INC,LREW/ 6HMULTIB,19,0/                                 MAPX
C                                                                          MAPX
      IF(MAPRUN) 101,100,101                                               MAPX
 100  YINC=5.0*DGX                                                         MAPX
      XCOORD=XMIN+DGX                                                      MAPX
      VINC=INC                                                             MAPX
      XCINC=VINC*DGX                                                       MAPX
      KKL=NBZX2-1                                                          MAPX
      NX=NXMAP-NBZX2-NBZX2                                                 MAPX
C     LEFT IS USED HERE AS A TEMPORARY STORAGE                             MAPX
      LEFT=(XMAX-X2)/DGX                                                   MAPX
C     PRINT MAP TITLE                                                      MAPX
      WRITE (ISOUT,7)                                                      MAPX
```

```
C      SELECT APPROPRIATE DISPLAY OPTION CODE
       IF(JC(1))147,147,131
 131   IF(JC(1)-6)132,132,147
 130   JC(1)=1
  132 N1=JC(1)
       GO TO (141,142,143,144,145,146),N1
 141   ASSIGN 150 TO N2
       WRITE (ISOUT,3)
       GO TO 102
 142   ASSIGN 151 TO N2
       WRITE (ISOUT,5)
       GO TO 102
 143   WRITE(ISOUT,19)
       ASSIGN 301 TO N2
       IF(LREW.NE.0) GO TO 1431
       LREW=1
       REWIND MBTAPE
 1431 WRITE (MBTAPE)BITLUM
       WRITE(MBTAPE)XMIN,XMAX,YMIN,YMAX,DGX,DGY
       GO TO 102
C
C************************ CODE INSERTION POINTS ************************
 144   CONTINUE
 145   CONTINUE
 146   CONTINUE
C************************ CODE INSERTION POINTS ************************
C
 147   WRITE (ISOUT,6)N1
       GO TO 130
 101   KKL=1
       NX=NXMAP-NBZX2
C      LEFT IS USED HERE AS A TEMPORARY STORAGE
       LEFT=(XMAX-X1)/DGX
       GO TO 170
C 102    PRINT ORDINATE DESCRIPTION
C
 102   WRITE (ISOUT,8)
       GO TO (161,162,163,164,165,166,167,168,169,171,172,173,174,175,176
      1,177,178,179,170,170),NREQ
 161   WRITE (ISOUT,9)
       GO TO 170
 162   WRITE (ISOUT,10)
       GO TO 170
 163   WRITE (ISOUT,11)T1
       GO TO 170
 164   WRITE (ISOUT,12)T1
       GO TO 170
 165   WRITE (ISOUT,13)T1,T2
       GO TO 170
 166   WRITE (ISOUT,14)
       GO TO 170
 167   WRITE (ISOUT,15)T1,T2
       GO TO 170
 168   WRITE (ISOUT,13)T1,T2
       WRITE(ISOUT,17)
       GO TO 170
 169   WRITE (ISOUT,12)T1
       WRITE (ISOUT,17)
       GO TO 170
 171   WRITE (ISOUT,18)T1,MASCHN
```

```
      WRITE(ISOUT,17)
      GO TO 170
  172 WRITE (ISOUT,23)
      GO TO 170
  173 WRITE (ISOUT,24)
      GO TO 170
  174 WRITE (ISOUT,25)
      GO TO 170
  175 WRITE (ISOUT,26)
      GO TO 170
  176 WRITE (ISOUT,27) T1,T2
      GO TO 170
  177 WRITE (ISOUT,28) T1,T2
      GO TO 170
C
C************************ CODE INSERTION POINTS *************************
  178 CONTINUE
  179 CONTINUE
C************************ CODE INSERTION POINTS *************************
C
  170 WRITE (ISOUT,20) XGZ,YGZ
      IF(JC(1).EQ.3)  GO TO 1702
C
C     PRINT A PAIR OF PASTE-ON Y SCALES HERE
      WRITE (ISOUT,21)
      YY=YMIN+DGY*FLOAT(NYMAP)
      DO 1701  J=1,NYMAP
      WRITE (ISOUT,22)YY,YY
 1701 YY=YY-DGY
 1702 IF(LEFT-NX) 1021,1022,1022
 1021 NX=LEFT
 1022 MM=NX/(INC)
      M=MM+1
C     LEFT IS USED HERE AS THE NUMBER OF PRINT COLUMNS IN THE LAST
C     PRINTER STRIP
      LEFT=NX-MM*(INC)
      IF (LEFT.NE.0) GO TO 2023
      M = MM
      LEFT = INC
C     STRIPS
 2023 DO 110 ISTRIP=1,M
      MAPRUN=MAPRUN+1
      IF (JC(1).EQ.3)  GO TO 1023
      XC2=XCOORD+TINC
      XC3=XC2+TINC
      WRITE (ISOUT,1)MAPRUN
      WRITE (ISOUT,16)XCOORD,XC2,XC3
 1023 KL=KKL+(NYMAP-1)*NXMAP
      IF(ISTRIP-M)103,104,103
  104 KINC=LEFT-1
      VLEFT=LEFT
      XCIN=VLEFT*DGX
      GO TO 1031
  103 KINC=INC-1
      XCIN=XCINC
 1031 CONTINUE
      KLINK = KINC+1
      IF(JC(1).EQ.3) WRITE(MBTAPE)NYMAP,KLINK
C
C     ROWS
```

```
      DO 200 J=1,NYMAP
      KH=KL+KINC
      KDC=0
      DO 201 K=KL,KH
  201 FSUM=FSUM+OMAP(K)
C
C     NUMBERS WITHIN ROWS
      DO 300 K=KL,KH
      KDC=KDC+1
C     TRANSFER TO CODE FOR SELECTED PRESENTATION
      GO TO N2,(150,151,301)
C
C 150 CODE FOR POWER OF TEN DISPLAY
  150 IF(OMAP(K))105,106,107
  105 ASSIGN 121 TO N3
      OMAP(K)=-OMAP(K)
      GO TO 109
  107 ASSIGN 300 TO N3
   109 H = ALOG10(OMAP(K))
      H1=AMOD(H,1.0)
      JMAP(KDC)=H-H1
      IF(JMAP(KDC).EQ.0)JMAP(KDC)=0
      OMAP(K)=10.0**H1
      IF(OMAP(K)-9.999)115,115,1091
 1091 OMAP(K)=OMAP(K)/10.0
      JMAP(KDC)=JMAP(KDC)+1
      GO TO 115
  106 JMAP(KDC)=0
      GO TO 300
  115 GO TO N3,(300,121)
C 121  RESET SIGN OF MAP COORDINATE
  121 OMAP(K)=-OMAP(K)
      GO TO 300
C
C 151 CODE FOR TWO-LINE F11.3 DISPLAY
  151 JMAP(KDC)=OMAP(K)/10.0
      ZMAP=JMAP(KDC)
      OMAP(K)=OMAP(K)-(ZMAP*10.0)
  300 CONTINUE
      WRITE (ISOUT,2)(JMAP(K),K=1,KDC)
      WRITE (ISOUT,4)(OMAP(K),K=KL,KH)
      GO TO 200
  301 WRITE (MBTAPE) (OMAP(K),K=KL,KH)
  200 KL=KL-NXMAP
      IF (JC(1).EQ.3)  GO TO 110
      WRITE (ISOUT,16)XCOORD,XC2,XC3
      XCOORD=XCOORD+XCIN
  110 KKL=KKL+INC
      RETURN
      END
$IBFTC PRC      LIST,DECK,M94/2
      SUBROUTINE PROC
C     26 FEB 67
C     P. FLUSSER  TECHNICAL OPERATIONS RESEARCH  SR  PROC
C***THIS SUBROUTINE COMPUTES A NUMBER, KTR(I), WHICH DETERMINES
C***INTO WHICH ZONE OR BUFFER  ZONE THE I TH PARTICLE HAS LANDED.
C*** IT SETS KTR(I)=0 IF THE I TH PARTICLE LANDED IN THE FIRST ZONE,
C*** AND CALLS SUBROUTINE CALC TO COMPUTE THE CONTRIBUTION TO THE
C*** FINAL RESULT OF THIS PARTICLE.  IT ALSO COMPUTES A NEW VALUE FOR
C*** FOR NE, THE NUMBER OF EMPTY SPACES IN THE PARTICLE ARRAY.
```

```
C*** FINALLY, THE NUMBER OF PARTICLES THAT HAVE FALLEN IN EACH ZONE
C*** IS COMPUTED  (NP(I)).
C
C ***********************************************************************
C
      COMMON /SET1/
     1          DIAM    ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2          SD      , SPAR    , SSAM  , THE    , TMP1   , TMP2     ,
     3          T2M     , U       , VPR   , W      , HBURST , SCLDHB   ,
     4          TID(40), RMIN    , IDISTR , SPAR1  , HBTAPE , FSUM     ,
     5          SPAR4   , SPAR5   , SPAR6 , SPAR7  , SPAR8  , SPAR9
      COMMON  /SET3/
     1    BZ              ,BZ2             ,BZZ             ,BZ22
     2   ,DELTAX          ,DGX             ,DGY             ,DIFCON
     3   ,DIFADJ          ,FMAS(500)       ,FMASS(200)      ,IC(18)
     4   ,ICON            ,ICTR            ,IH              ,IOT(18)
     5   ,IP              ,IPOUT           ,ITT(18)         ,IV
     6   ,JC(18)          ,JIN             ,JOUT            ,JPOUT
     7   ,KTR(500)        ,KTAPE           ,LAST            ,MAPRUN
     8   ,MARRAY          ,MIN             ,MXREQ
     9   ,N               ,NA              ,NBZX            ,NBZX2
     1   ,NBZY            ,NCL             ,NE              ,NF
     2   ,NIJ             ,NMAP            ,NMAX            ,NOX
     3   ,NP(21)          ,NREQ            ,NS              ,NTAPES
     4   ,NTAPET          ,NTASK           ,NXMAP           ,NYMAP
     5   ,YMIN            ,PS(500)         ,PSIZE(200)      ,PACT(200)
     6   ,ROPART                           ,T(500)          ,T1
     7   ,T2              ,TLIMIT          ,X(500)          ,XF
     8   ,XO              ,XMAX            ,XMIN            ,XNMAP
     9   ,X1              ,X2              ,X3              ,X4
     1   ,Y(500)          ,YF              ,YO              ,YMAX
      COMMON /SET4/  OMAP(4000)
C
C ***********************************************************************
C
      DATA PROGRM/6H PROC /
C
C ***********************************************************************

C     NGONE IS THE NUMBER OF PARTICLES DISCARDED
      IF(ICTR) 1,1,2
C     INTO OR NEAR ENOUGH TO THE AREA OF INTEREST
    1 JCTR = 0
      DO 107 I=1,NIJ
      IF(X(I)-XO) 107,108,108
  108 IF(XF-X(I)) 107,109,109
  109 IF(Y(I)-YO) 107,110,110
  110 IF(YF-Y(I)) 107,111,111
  111 JCTR=JCTR+1
      X(JCTR)=X(I)
      Y(JCTR)=Y(I)
      T(JCTR)=T(I)
      PS(JCTR)=PS(I)
      FMAS(JCTR)=FMAS(I)
  107 CONTINUE
C     NGONE IS THE NUMBER OF PARTICLES DISCARDED
      NGONE=NIJ-JCTR
      IF(NGONE) 20,2,52
 20   IRROR=-20
      GO TO 7734
```

```
   52 JPTR=JCTR+1
      BIG=XO-1.0
      DO 104 I=JPTR,NIJ
      KTR(I)=0
  104 X(I)=BIG
      NE=NE+NGONE
      NIJ=JCTR
      IF(JCTR)21,15,2
 21   IRROR=-21
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)
C ***** END OF PARTICLE (CLOUD SUBDIVISION) DISCARDING CODE *********
    2 DO 9 I=1,NIJ
      R=X(I)-X1
      K=JIN+2
      DO 8 J=2,K,2
      R=R-BZ2
      IF(R) 3,3,6
    3 IF(J-2) 4,4,5
    4 KTR(I)=0
   10 NE=NE+1
   11 IP=I
      CALL CALC
      GO TO 9
    5 KTR(I)=J-3
      NP(J-3)=NP(J-3)+1
      IF(J-4)22,25,9
 22   IRROR=-22
      GO TO 7734
    6 R=R-DELTAX
      IF(R) 7,7,8
    7 KTR(I)=J-2
      IF(J-2) 10,10,12
   12 NP(J-2)=NP(J-2)+1
      GO TO 9
   25 KTR(I)=2
      GO TO 11
    8 CONTINUE
      KTR(I)=JIN
      NP(JIN)=NP(JIN)+1
    9 CONTINUE
   15 RETURN
      END
$IBFTC RNN1    LIST,DECK,M94/2
      SUBROUTINE RUN1
C     26  FEB  67
C     P. FLUSSER  TECHNICAL OPERATIONS RESEARCH  SR  RUN1
C
C***THIS SUBROUTINE IS CALLED IF AND ONLY IF ALL THE PARTICLES THAT
C***ARE ON THE TAPE WHICH WILL BE READ NEXT EITHER FALL INTO
C*** THE AREA CURRENTLY BEING CONSIDERED OR CAN BE DISCARDED
C*** ALTOGETHER.  THIS SUBROUTINE CALLS CALC WHICH THEN COMPUTES
C*** THE CURRENT REQUEST.
C
C *********************************************************************
C
      COMMON /SET1/
     1        DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2        SD     , SPAR   , SSAM   , TME    , TMP1   , TMP2     ,
     3        T2M    , U      , VPR    , W      , HBURST , SCLDHB   ,
     4        TID(40), RMIN   , IDISTR , SPAR1  , MBTAPE , FSUM     ,
```

```
      5        SPAR4  , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9
       COMMON  /SET3/
     1     BZ            ,BZ2          ,BZZ          ,BZ22
     2    ,DELTAX        ,DGX          ,DGY          ,DIFCON
     3    ,DIFADJ        ,FMAS(500)    ,FMASS(200)   ,IC(18)
     4    ,ICON          ,ICTR         ,IH           ,IOT(18)
     5    ,IP            ,IPOUT        ,ITT(18)      ,IV
     6    ,JC(18)        ,JIN          ,JOUT         ,JPOUT
     7    ,KTR(500)      ,KTAPE        ,LAST         ,MAPRUN
     8    ,MARRAY        ,MIN          ,MXREQ
     9    ,N             ,NA           ,NBZX         ,NBZX2
     1    ,NBZY          ,NCL          ,NE           ,NF
     2    ,NIJ           ,NMAP         ,NMAX         ,NOX
     3    ,NP(21)        ,NREQ         ,NS           ,NTAPES
     4    ,NTAPET        ,NTASK        ,NXMAP        ,NYMAP
     5    ,YMIN          ,PS(500)      ,PSIZE(200)   ,PACT(200)
     6    ,ROPART                      ,T(500)       ,T1
     7    ,T2            ,TLIMIT       ,X(500)       ,XF
     8    ,XO            ,XMAX         ,XMIN         ,XNMAP
     9    ,X1            ,X2           ,X3           ,X4
     1    ,Y(500)        ,YF           ,YO           ,YMAX
       COMMON /SET4/  OMAP(4000)
C
C ***********************************************************************
C
       DATA PROGRM/6H RUN1 /
C
C ***********************************************************************
C ***********************************************************************
C
C*** ARE THERE ANY CURRENT PARTICLES LEFT IN CORE...
C*** HAVE THOSE PARTICLES WHICH FALL OUTSIDE THE AREA OF INTEREST
C***BEEN DISCARDED...
 10    IF(ICTR)2,3,4
 2     IRROR=-2
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)
 3     ASSIGN 200 TO N
       GO TO 5
C***ARE THERE ANY CURRENT PARTICLES LEFT IN CORE...
 4     IF(NIJ)41,42,42
 41    ASSIGN 200 TO N
       NIJ=MARRAY
       GO TO 43
 42    ASSIGN 100 TO N
 5     READ (IPOUT)NIJ
       IF(NIJ) 6,7,8
C***ARE WE DONE...
 6     IRROR=-6
       GO TO 7734
 8     READ (IPOUT)(X(I),Y(I),T(I),PS(I),FMAS(I),I=1,NIJ)
 43    DO 300 I=1,NIJ
C***PRELIMINARY CHECK OF PARTICLES
       GO TO N,(100,200)
 200   IF(X(I)-X1)300,201,201
 201   IF(X(I)-X4)202,202,300
 202   IF(Y(I)-YO)300,203,203
 203   IF(Y(I)-YF)100,100,300
 100   IP=I
       CALL CALC
 300   CONTINUE
```

```
      GO TO 10
    7 RETURN
      END
$IBFTC SHIF    LIST,DECK,M94/2
      SUBROUTINE SHIFT
C     26  FEB  67
C     P. FLUSSER  TECHNICAL OPERATIONS RESEARCH  SR  SHIFT
C     THIS SUBROUTINE WRITES ON THE APPROPRIATE TAPE THE PARTICLE
C     PARAMETERS OF THOSE PARTICLES WHICH FALL IN THE MOST DENSELY
C     POPULATED ZONE OF THE AREA OF INTEREST.  IT ALSO COMPUTES A NEW
C     VALUE OF NF, THE NUMBER OF EMPTY SPACES IN THE PARTICLE ARRAY.
C
C ********************************************************************
C
C     NS      = NUMBER OF PARTICLES TO BE WRITTEN OUT
C     NE      = NUMBER OF EMPTY SPEACES CURRENTLY AVAILABLE
C     KTR(I) = INDEX INDICATING INTO WHICH ZONE THE I TH PARTICLE HAS
C             LANDED
C     JOUT    = INDEX OF ZONE TO BE WRITTEN OUT
C     X,Y,T,ID,PSI,  =  PARTICLE PARAMETERS
C     IOT(JOUT/2) = TAPE NUMBER OF TAPE TO BE USED IN CURRENT WRITE
C     KTAPE       = TAPE NUMBER OF TAPE TO BE USED IN CURRENT WRITE
C     JIN     = LARGEST INDEX APPEARING IN PARTICLE CLASSIFICATION
C     NMAX    = MAXIMIM NUMBER OF UNSORTED PARTICLES TO BE WRITTEN  OUT
C               IN ONE DATA BLOCK
C     JT      = TOP COUNTER
C     JB      = BOTTOM COUNTER
C
C ********************************************************************
C
C     IF NTH,NBH OR NTPH ARE ZERO, THERE IS A HOLE IN THE TOP, BOTTOM OR
C     TEMPORARY STORAGE RESPECTIVELY.  IF THESE VARIABLES ARE 1,
C     THERE IS NO HOLE THERE
C     NHCTR = INDEX KEEPING TRACK OF SPACE AVAILABLE FOR INSERTION OF
C               CONTENTS OF TEMPORARY STORAGE AT THE END OF EXECUTION.
C     NP(I)  = NUMBER OF PARTICLES WITH CLASSIFICATION NUMBER I
C     IF LAST=0, THE LAST ZONE HAS BEEN SORTED.  IF LAST=1 THIS STILL
C     NEEDS TO BE DONE.
C     MARRAY = DIMENSION OF PARTICLE ARRAY
C
C ********************************************************************
C
      COMMON /SET1/
     1        DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2        SD     , SPAR   , SSAM   , TME    , TMP1   , TMP2     ,
     3        T2M    , U      , VPR    , W      , HBURST , SCLDHB   ,
     4        TID(40), RMIN   , IDISTR , SPAR1  , MBTAPE , FSUM     ,
     5        SPAR4  , SPAR5  , SPAR6  , SPAR7  , SPAR8  , SPAR9
      COMMON  /SET3/
     1   BZ            ,BZ2           ,BZZ           ,BZ22
     2  ,DELTAX        ,DGX           ,DGY           ,DIFCON
     3  ,DIFADJ        ,FMAS(500)     ,FMASS(200)    ,IC(18)
     4  ,ICON          ,ICTR          ,IH            ,IOT(18)
     5  ,IP            ,IPOUT         ,ITT(18)       ,IV
     6  ,JC(18)        ,JIN           ,JOUT          ,JPOUT
     7  ,KTR(500)      ,KTAPE         ,LAST          ,MAPRUN
     8  ,MARRAY        ,MIN           ,MXREG
     9  ,N             ,NA            ,NBZX          ,NBZX2
     1  ,NBZY          ,NCL           ,NE            ,NF
     2  ,NIJ           ,NMAP          ,NMAX          ,NOX
```

```
     3   ,NP(21)        ,NREQ          ,NS            ,NTAPES
     4   ,NTAPET        ,NTASK         ,NXMAP         ,NYMAP
     5   ,YMIN          ,PS(500)       ,PSIZE(200)    ,PACT(200)
     6   ,ROPART                       ,T(500)        ,T1
     7   ,T2            ,TLIMIT        ,X(500)        ,XF
     8   ,X0            ,XMAX          ,XMIN          ,XNMAP
     9   ,X1            ,X2            ,X3            ,X4
     1   ,Y(500)        ,YF            ,Y0            ,YMAX
      COMMON /SET4/  OMAP(4000)
C
C ***********************************************************************
C
      DATA PROGRM/6H SHIFT/
C
C ***********************************************************************
C ***********************************************************************
C
C     ARE WE SORTING THE LAST ZONE ... 3=NO, 6=YES
      IF(LAST) 3,3,60
C  60 ARE WE DUMPING LAST ZONE ... 5=YES, 3=NO
   60 IF(JOUT-JIN) 3,3,6
 6    IRROR=-6
      GO TO 7734
C     SET UP COUNTERS
    3 JT = 1
      JB = MARRAY
      NTH=1
      NBH=1
      NTPH=0
      NHCTR=0
C    IS THERE A HOLE IN THE TOP ))) IF YES, EXAMINE BOTTOM)
   10 IF(KTR(JT)) 9,12,11
 9    IRROR=-9
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)
   12 NTH=0
      GO TO 15
C     IS JT TH PARTICLE TO BE DUMPED ... IF YES, EXAMINE NEXT TO
C     PARTICLE, IF NOT, EXAMINE BOTTOM PARTICLE?
   11 IF(KTR(JT)-JOUT) 14,13,14
C*** THIS PARTICLE DOES NOT FALL IN BUFFER ZONE.  ZERO OUT
C***IDENTIFICATION NUMBER.
   13 KTR(JT)=0
      GO TO 777
   14 IF(KTR(JT)-1-JOUT) 15,16,15
C*** THIS PARTICLE FALLS IN BUFFER ZONE.  IT NEEDS TO BE BOTH
C*** WRITTEN OUT AND RETAINED.  INCREASE IDENTIFICATION NUMBER
C*** BY ONE?
   16 KTR(JT)=KTR(JT)+1
  777 JT=JT+1
      IF(JT-NS) 10,10,40
C     IS THERE A HOLE IN THE BOTTOM... IF YES, SEE IF THERE IS
C     PARTICLE THAT WANTS TO COME DOWN FROM THE TOP.  IF NOT, EXAMINE
C     PARTICLE.
   15 IF(NBH) 17,18,17
C     DOES PARTICLE WANT TO BE DUMPED... IF YES, MOVE IT TO THE TOP, I
C     NOT, EXAMINE NEXT BOTTOM PARTICLE
   17 IF(KTR(JB)) 20,19,20
   19 NBH=0
   18 IF(NTH) 78,888,78
C     MOVE TOP TO BOTTOM
```

```
   78 X(JB)=X(JT)
      Y(JB)=Y(JT)
      T(JB)=T(JT)
      PS(JB)=PS(JT)
      FMAS(JB)=FMAS(JT)
      KTR(JB)=KTR(JT)
      NTH=0
      NBH=1
C     ARE WE FINISHED .. IF NOT, CONTINUE,  IF YES, DUMP PARTICLES
C     COMPUTE A NEW VALUE FOR NE
C*** ARE WE DONE...
  888 JB=JB-1
      IF(JB-NS) 40,17,17
   20 IF(KTR(JB)-JOUT) 24,23,24
C*** THIS PARTICLE DOES NOT FALL IN BUFFER ZONE.
C*** XERO OUT IDENTIFICATION NUMBER.
   23 KTR(JB)=0
      GO TO 26
   24 IF(KTR(JB)-1-JOUT) 886,25,888
C*** THIS PARTICLE FALLS IN BUFFER ZONEZ.. IT NEEDS TO BE BOTH
C*** WRITTEN OUT AND RETAINED.  INCREASE ID. NO; BY ONE.
   25 KTR(JB)=KTR(JB)+1
   26 IF(NTH) 27,87,27
   27 IF(NTPH) 30,77,30
 30   IRROR=-30
      GO TO 7734
C     MOVE TOP TO TEMPORARY STORAGE
   77 XEMP=X(JT)
      YEMP=Y(JT)
      TEMP=T(JT)
      PEMP=PS(JT)
      FEMP=FMAS (JT)
      KEMP=KTR(JT)
      NTPH=1
C     MOVE BOTTOM TO TOP
   87 X(JT)=X(JB)
      Y(JT)=Y(JB)
      T(JT)=T(JB)
      PS(JT)=PS(JB)
      FMAS(JT)=FMAS(JB)
      KTR(JT)=KTR(JB)
C*** TO AVOID DUPLICATION OF PARTICLES, ZERO OUT IDENTIFICATION
C*** NUMBER.
      KTR(JB)=0
      NBH=0
      NTH=1
C*** KEEP TRACK OF EMPTY SPACE IN BOTTOM
      NHCTR=JB
      GO TO 777
   40 IF(NTPH) 67,5000,67
C*** MOVE TEMPORARY STORAGE TO BOTTOM.
   67 X(NHCTR)=XEMP
      Y(NHCTR)=YEMP
      T(NHCTR)=TEMP
      PS(NHCTR)=PEMP
      FMAS(NHCTR)=FEMP
      KTR(NHCTR)=KEMP
 5000 WRITE (KTAPE)NS
      WRITE (KTAPE)(X(I),Y(I),T(I),PS(I),FMAS(I),I=1,NS)
C*** ADJUST THE NUMBER OF EMPTIES AND THE PARTICLE COUNT
```

```
      IF(JOUT-2) 100,102,101
 100  IRROR=-100
      GO TO 7734
  102 NE=NE+NP(1)+NP(2)
      NP(1)=0
      GO TO 110
  101 IF(JOUT-JIN) 103,103,105
 105  IRROR=-105
      GO TO 7734
  103 NE=NE+NP(JOUT)
  110 NP(JOUT+2)=NP(JOUT+2)+NP(JOUT+1)
      NP(JOUT+1)=0
      NP(JOUT)=0
  120 RETURN
      END
$IBFTC SLID    LIST,DECK,M94/2
      SUBROUTINE SLIDE
C     P. FLUSSER   TECHNICAL OPERATIONS RESEARCH   SR  SLIDE
C     26 FEB 67
C
C***SUBROUTINE SLIDE MOVES THE CONTENTS OF THE RIGHT BUFFER ZONE
C***INTO THE LEFT BUFFER ZONE AND ZEROS OUT THE REMAINING
C***ENTRIES IN THE MAP ARRAY.
C***NOX   = NUMBER OF OUTPUT GRID POINTS IN THE ZONE ITSELF
C***  COUNTING IN THE X DIRECTION.
C*** NBZX2=  NUMBER OF OUTPUT GRID POINTS IN THE BUFFER ZONE
C***         COUNTING IN THE X DIRECTION,
C*** NX=   NUMBER OF OUTPUT GRID POINTS IN THE ZONE ITSELF PLUS
C*** ONE BUFFER ZONE COUNTING IN THE X DIRECTION.
C*** NXMAP= NUMBER OF OUTPUT GRID POINTS IN THE ENTIRE MAP ,COUNTING
C***TWO BUFFER ZONES) IN THE X DIRECTION.
C*** NYMAP= NUMBER OF OUTPUT GRID POINTS IN ENTIRE MAP COUNTING
C*** IN Y DIRECTION.
C*** OMAP= MAP STORAGE
C
C ********************************************************************
C
      COMMON /SET1/
     1         DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT    ,
     2         SD     , SPAR    , SSAM   , THE    , TMP1   , TMP2     ,
     3         T2M    , U       , VPR    , W      , WBURST , SCLDHB   ,
     4         TID(40), RMIN    , IDISTR , SPAR1  , MBTAPE , FSUM     ,
     5         SPAR4  , SPAR5   , SPAR6  , SPAR7  , SPAR8  , SPAR9
      COMMON  /SET3/
     1    BZ             ,BZ2           ,BZZ           ,BZ22
     2   ,DELTAX         ,DGX           ,DGY           ,DIFCON
     3   ,DIFADJ         ,FMAS(500)     ,FMASS(200)    ,IC(18)
     4   ,ICON           ,ICTR          ,IH            ,IOT(18)
     5   ,IP             ,IPOUT         ,ITT(18)       ,IV
     6   ,JC(18)         ,JIN           ,JOUT          ,JPOUT
     7   ,KTR(500)       ,KTAPE         ,LAST          ,MAPRUN
     8   ,MARRAY         ,MIN           ,MXREQ
     9   ,N              ,NA            ,NBZX          ,NBZX2
     1   ,NBZY           ,NCL           ,NE            ,NF
     2   ,NIJ            ,NMAP          ,NMAX          ,NOX
     3   ,NP(21)         ,NREQ          ,NS            ,NTAPES
     4   ,NTAPET         ,NTASK         ,NXMAP         ,NYMAP
     5   ,YMIN           ,PS(500)       ,PSIZE(200)    ,PACT(200)
     6   ,ROPART                        ,T(500)        ,T1
     7   ,T2             ,TLIMIT        ,X(500)        ,XF
```

```
     8   ,XO             ,XMAX           ,XMIN           ,XNMAP
     9   ,X1             ,X2             ,X3             ,X4
     1   ,Y(500)         ,YF             ,YO             ,YMAX
      COMMON /SET4/  OMAP(4000)
C
C **********************************************************************
C **********************************************************************
C
      M=NBZX2+NOX
      NX=M
      N=0
      DO 503 J=1,NYMAP
      DO 501 K=1 ,NBZX2
      NN=N+K
      MM=M+K
C*** SHIFT BUFFER ZONE
 501  OMAP(NN)=OMAP(MM)
      L=N+NBZX2+1
      LMN=L+NX-1
      DO 502 I=L,LMN
C***  ZERO OUT WHATEVER IS LEFT
  502 OMAP(I)=0.0
      M=M+NXMAP
  503 N=N+NXMAP
      RETURN
      END
$IBFTC ZER     LIST,DECK,M94/2
      SUBROUTINE ZERO
C     26  FEB  67
C     P. FLUSSER  TECHNICAL OPERATIONS RESEARCH  SR  ZERO
C*** THIS SUBROUTINE MAKES ROOM FOR NIJ PARTICLES TO BE WRITTEN IN
C*** THE PARTICLE ARRAY BY MOVING THE PARTICLE PARAMETERS INTO THE BODY
C***OF THE ARRAY.
C*** JT= TOP COUNTER
C*** JB= BOTTOM COUNTER
C
C **********************************************************************
      COMMON /SET1/
     1        DIAM   ,DETID(12),IRISE  , IEXEC  , ISIN   , ISOUT   ,
     2        SD     , SPAR    , SSAM   , THE    , TMP1   , TMP2    ,
     3        T2M    , U       , VPR    , W      , HBURST , SCLDHB  ,
     4        TID(40), RMIN    , IDISTR , SPAR1  , HBTAPE , FSUK    ,
     5        SPAR4  , SPAR5   , SPAR6  , SPAR7  , SPAR8  , SPAR9
      COMMON  /SET3/
     1    BZ             ,BZ2            ,BZZ            ,BZ22
     2   ,DELTAX         ,DGX            ,DGY            ,DIFCON
     3   ,DIFADJ         ,FMAS(500)      ,FMASS(200)     ,IC(18)
     4   ,ICON           ,ICTR           ,IH             ,IOT(18)
     5   ,IP             ,IPOUT          ,ITT(18)        ,IV
     6   ,JC(18)         ,JIN            ,JOUT           ,JPOUT
     7   ,KTR(500)       ,KTAPE          ,LAST           ,MAPRUN
     8   ,MARRAY         ,MIN            ,MXREQ
     9   ,N              ,NA             ,NBZX           ,NBZX2
     1   ,NBZY           ,NCL            ,NE             ,NF
     2   ,NIJ            ,NMAP           ,NMAX           ,NOX
     3   ,NP(21)         ,NREQ           ,NS             ,NTAPES
     4   ,NTAPET         ,NTASK          ,NXMAP          ,NYMAP
     5   ,YMIN           ,PS(500)        ,PSIZE(200)     ,PACT(200)
     6   ,ROPART                         ,T(500)         ,T1
     7   ,T2             ,TLIMIT         ,X(500)         ,XF
```

```
     8 ,X0                 ,XMAX               ,XMIN               ,XNMAP
     9 ,X1                 ,X2                 ,X3                 ,X4
     1 ,Y(500)             ,YF                 ,YO                 ,YMAX
      COMMON /SET4/  OMAP(4000)
      DATA PROGRM/6H ZERO /
      JT=1
      JB=MARRAY
C*** IS THERE A HOLE IN THE TOP... IF YES, GO ON, IF NOT, CHECK BOTTOM.
 2    IF(KTR(JT))3,4,5
 3    IRROR=-3
 7734 CALL ERROR(PROGRM,IRROR,ISOUT)
 4    JT=JT+1
C*** ARE WE DONE...
      IF(JT-N(J))2,2,10
C*** IS THERE HOLE IN THE BOTTOM... IF YES, MOVE A PARTICLE FROM THE
C*** TOP, IF NOT, TRY AND FIND ONE.
 5    IF(KTR(JB))6,7,8
 6    IRROR=-6
      GO TO 7734
C*** MOVE PARTICLE PARAMETERS AND DECREMENT BOTTOM COUNTER.
 7    X(JB)=X(JT)
      Y(JB)=Y(JT)
      T(JB)=T(JT)
      PS(JB)=PS(JT)
      FMAS(JB)=FMAS(JT)
      KTR(JB)=KTR(JT)
      JB=JB-1
      GO TO 4
 8    JB=JB-1
C*** ARE THERE ENOUGH HOLES....
      IF(JB-N(J))9,9,5
 9    IRROR=-9
      GO TO 7734
 10   RETURN
      END
$IBFTC PAM2ND  LIST,DECK,M94/2
      SUBROUTINE PAM2
C
C     R C TOMPKINS -- US ARMY NUCLEAR DEFENSE LABS
C     OCTOBER 1966
C   EXECUTIVE PROGRAM FOR THE TIME-DEPENDENT PART OF THE PARTICLE
C   ACTIVITY MODULE
CALLED BY LINK9 AND BY CALC
C
C  *  *  *  *  *  *  *  *  *  *  GLOSSARY  *  *  *  *  *  *  *  *  *  *  *
C
C   FP(200)        ACTIVITY DENSITY IN EACH PARTICLE SIZE FRACTION
C   ITAB           NUMBER OF PARTICLE SIZE CLASSES
C   MASCHN         MASS NUMBER REQUESTED FOR OUTPUT WITH JGO = 2
C   SV(200)        FRACTION OF TOTAL SURFACE IN EACH PARTICLE SIZE CLASS
C                  DIVIDED BY FRACTION OF TOTAL VOLUME
C
C  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *
C
      COMMON/FISHIN/
     1    ABZGN (700) ,ABUNDO(700) ,BRANCH(130) ,CAPFIS
     2   ,DCON  (700) ,IBRA        ,INUC        ,MAXNUC
     3   ,MULT  (11)  ,NUCLID(700)
C
      COMMON/INDUCE/
```

```
     1    ALHFOM        ,FAC   (7,18),FOGRNY(7,18),ISO    (18)
     2   ,LMAX          ,XLAM  (7,18)
C
      COMMON/UTILTY/
     1    KOUT          ,NPRNT (15)
C
      COMMON/OUTPUT/
     1    FISNUM        ,FP    (200) ,FW           ,ITAB        ,JGO
     2   ,MASCHN        ,SIGMAS
C
      COMMON/DECAY/
     1    IGO           ,JD            ,KDOS         ,TENTER
     2   ,TEXIT         ,TIME
C
      COMMON  /SET3/
     1    BZ             ,BZ2            ,BZZ            ,BZ22
     2   ,DELTAX         ,DGX            ,DGY            ,DIFCON
     3   ,DIFADJ         ,FMAS(500)      ,FMASS(200)     ,IC(18)
     4   ,ICON           ,ICTR           ,IH             ,IOT(18)
     5   ,IP             ,IPOUT          ,ITT(18)        ,IV
     6   ,JC(18)         ,JIN            ,JOUT           ,JPOUT
     7   ,KTR(500)       ,KTAPE          ,LAST           ,MAPRUN
     8   ,MARRAY         ,MIN            ,MXREQ
     9   ,MYDUMY         ,NA             ,NBZX           ,NBZX2
     1   ,NBZY           ,NCL            ,NE             ,NF
     2   ,NIJ            ,NMAP           ,NMAX           ,NOX
     3   ,NP(21)         ,NREQ           ,NS             ,NTAPES
     4   ,NTAPET         ,NTASK          ,NXMAP          ,NYMAP
     5   ,YMIN           ,PS(500)        ,PSIZE(200)     ,PACT(200)
     6   ,ROPART                         ,T(500)         ,T1
     7   ,T2             ,TLIMIT         ,X(500)         ,XF
     8   ,XO             ,XMAX           ,XMIN           ,XNMAP
     9   ,X1             ,X2             ,X3             ,X4
     1   ,Y(500)         ,YF             ,YO             ,YMAX
C
      LOGICAL JD,IGO,KDOS,NPRNT
C
  100 FORMAT
     1    (17H1TOTAL PAM OUTPUT/9X5HPSIZE22X2HFP)
  101 FORMAT
     1    (5X1PE12.4,14XE12.4)
C
      DO 10I = 1,ITAB
   10 FP(I) = 0.0
C
      GO TO (1,2,3),JGO
C
    1 CALL GXPSR
      IF (CAPFIS)3,3,4
    4 CALL URAN
    3 IF (LMAX)5,5,6
    6 CALL INDCD2
    5 IF(.NOT..PRNT(15)) RETURN
      WRITE (KOUT,100)
      WRITE (KOUT,101) (PSIZE(I),FP(I),I=1,ITAB)
      RETURN
    2 CALL MCHDEP
      GO TO 5
      END
      GO TO 5
```

```
$IBFTC GXTS    LIST,DECK,M94/2
      SUBROUTINE GXPSR
C
C     CASSIDY - NRDL / TOMPKINS - NDL
C
C     NOVEMBER 1966
CALLED BY PAM2
      COMMON/FISHIN/
     1    ABEGN (700) ,ABUNDO(700) ,BRANCH(130) ,CAPFIS
     2   ,DCON  (700) ,IBRA        ,INUC        ,MAXNUC
     3   ,MULT  (11)  ,NUCLID(700)
C
      COMMON/FRYLNG/
     1    BSUBK (90)  ,ERM   (185) ,JRM   (185) ,KRM     ,ECF(90)
C
      COMMON/UTILTY/
     1    MOUT         ,NPRNT (15)
C
      COMMON/OUTPUT/
     1    FISNUM       ,FP    (200) ,FW          ,ITAB        ,JGO
     2   ,MASCHN       ,SIGMAS
C
      COMMON/DECAY/
     1    IGO          ,JD          ,KDOS        ,TENTER
     2   ,TEXIT        ,TIME
C
      COMMON  /SFT3/
     1    BZ              ,BZ2             ,BZZ             ,BZ22
     2   ,DELTAX          ,DGX             ,DGY             ,DIFCON
     3   ,DIFADJ          ,FMAS(500)       ,FMASS(200)      ,IC(18)
     4   ,ICON            ,ICTR            ,IH              ,IOT(18)
     5   ,IP              ,IPOUT           ,ITT(18)         ,IV
     6   ,JC(18)          ,JIN             ,JOUT            ,JPOUT
     7   ,KTR(500)        ,KTAPE           ,LAST            ,MAPRUN
     8   ,MARRAY          ,MIN             ,MXREQ
     9   ,MYDUMY          ,NA              ,NBZX            ,NBZX2
     1   ,NBZY            ,NCL             ,NE              ,NF
     2   ,NIJ             ,NMAP            ,NMAX            ,NOX
     3   ,NP(21)          ,NREQ            ,NS              ,NTAPES
     4   ,NTAPE1          ,NTASK           ,NXMAP           ,NYMAP
     5   ,NMIN            ,PS(500)         ,PSIZE(200)      ,PACT(200)
     6   ,RCPART                           ,T(500)          ,T1
     7   ,T2              ,TLIMIT          ,X(500)          ,XF
     8   ,XO              ,XMAX            ,XMIN            ,XNMAP
     9   ,X1              ,X2              ,X3              ,X4
     1   ,Y(500)          ,YF              ,YO              ,YMAX
C
      DIMENSION XRT(90)
C
      LOGICAL JD,IGO,KDOS,NPRNT
      DATA CROSS,UNIT/100.0,1.0/
C
  901 FORMAT
     1    (16H1OUTPUT OF GXPSR/5X13HPARTICLE SIZE7X24HFISSION PRODUCT AC
     2TIVITY)
  902 FORMAT
     1    (8X7HMICRONS16X11H(R>M**2)/HR//)
  903 FORMAT
     1    (5X1PE12.4,14XE12.4)
  912 FORMAT
```

```
     1     (8X7HMICRONS,18X6HR*M**2//)
C
      CALL BATMAN
      MAXMCH = 90
      MCH = 0
      DO 1 I = 1,MAXMCH
    1 XRT(I) = 0.0
C
      DO 10 J = 1,KRM
      K = JRM(J)
      IF (ERM(J))11,10,12
   11 MCH = MCH + 1
COMPUTE MASS CHAIN NORMALIZATION FACTOR
C
   12 XRT(MCH) = XRT(MCH) + ABUNDO(K)*ABS(ERM(J))
C
   10 CONTINUE
C
      DO 20 LC = 1,MCH
      IF (XRT(LC))20,20,21
   21 BNEX = BSURK(LC)
      CRISS = CROSS**BNEX
      RADIAL = ECF(LC)/(UNIT + CRISS*ECF(LC))
      STRAIT = RADIAL*CRISS
      TNEX = FISNUM*XRT(LC)
      DO 40 LD = 1,ITAR
   40 FP(LD) = FF(LD) + (RADIAL*PSIZE(LD)**BNEX + STRAIT)*TNEX*FMASS(LD)
   20 CONTINUE
C
C
      IF (.NOT.NPRNT(10)) RETURN
C
      WRITE (KOUT,901)
      IF (JD) GO TO 101
      WRITE (KOUT,912)
      GO TO 102
  101 WRITE (KOUT,902)
  102 CONTINUE
      DO 103 I=1,ITAB
      WRITE (KOUT,903) PSIZE(I),FP(I)
  103 CONTINUE
C
      RETURN
      END
$IBFTC URANX   LIST,DECK,M94/2
      SUBROUTINE URAN
C
C     R C TOMPKINS - US ARMY NUCLEAR DEFENSE LABS
C     MAY 1966
CALLED BY PAM2
C
C   DLAM           DISINTEGRATION CONSTANT OF NP239
C   PLAM           DISINTEGRATION CONSTANT OF U239
C
      COMMON/FISHIN/
     1     ABEGN (700) ,ABUNDO(700) ,BRANCH(130) ,CAPFIS
     2    ,DCON  (700) ,IBRA         ,INUC         ,MAXNUC
     3    ,MULT  (11)  ,NUCLID(700)
C
      COMMON/UTILTY/
```

```
     1    KOUT         ,NPRNT (15)
      COMMON/OUTPUT/
     1    FISNUM       ,FP    (200) ,FW             ,ITAB        ,JGO
     2   ,MASCHN       ,SIGMAS
      COMMON/DECAY/
     1    IGO          ,JD           ,KDOS          ,TENTER
     2   ,TEXIT        ,TIME
C
      COMMON  /SET3/
     1    BZ            ,BZ2           ,BZZ            ,BZ22
     2   ,DELTAX        ,DGX           ,DGY            ,DIFCON
     3   ,DIFADJ        ,FMAS(500)     ,FMASS(200)     ,IC(18)
     4   ,ICON          ,ICTR          ,IH             ,IOT(18)
     5   ,IP            ,IPOUT         ,ITT(18)        ,IV
     6   ,JC(18)        ,JIN           ,JOUT           ,JPOUT
     7   ,KTR(500)      ,KTAPE         ,LAST           ,MAPRUN
     8   ,MARRAY        ,MIN           ,MXREQ
     9   ,MYDUMY        ,NA            ,NBZX           ,NBZX2
     1   ,NBZY          ,NCL           ,NE             ,NF
     2   ,NIJ           ,NMAP          ,NMAX           ,NOX
     3   ,NP(21)        ,NREQ          ,NS             ,NTAPES
     4   ,NTAPET        ,NTASK         ,NXMAP          ,NYMAP
     5   ,YMIN          ,PS(500)       ,PSIZE(200)     ,PACT(200)
     6   ,ROPART                       ,T(500)         ,T1
     7   ,T2            ,TLIMIT        ,X(500)         ,XF
     8   ,XO            ,XMAX          ,XMIN           ,XNMAP
     9   ,X1            ,X2            ,X3             ,X4
     1   ,Y(500)        ,YF            ,YO             ,YMAX
CCCCC
      LOGICAL JD,IGO,KDOS,NPRNT
C
COMPUTE U239 DISINTEGRATION CONSTANT
      PLAM = 0.693147/(23.5*60.0)
COMPUTE NP239 DISINTEGRATION CONSTANT
      DLAM = 0.693147/(56.0*3600.0)
C
    2 AZERO = CAPFIS*1.E4*PLAM
      GLMP = DLAM/(DLAM - PLAM)
      GLUMP = AZERO*GLMP
C
      IF (.NOT.JD) GO TO 3
      ABURAN = AZERO*EXP (-PLAM*TIME)
      ABNEP = GLMP*ABURAN - GLUMP*EXP (-DLAM*TIME)
      GO TO 7
C
    3 IF (.NOT.KDOS) GO TO 4
      ABURAN = AZERO/PLAM*(EXP (-PLAM*TENTER) - EXP (-PLAM*TEXIT))
      ABNEP = GLMP*ABURAN -
     1GLUMP*(EXP (-DLAM*TENTER) - EXP (-DLAM*TEXIT))/DLAM
      GO TO 7
C
    4 ABURAN = AZERO/PLAM*EXP (-PLAM*TENTER)
      ABNEP = GLMP*ABURAN - GLUMP/DLAM*EXP (-DLAM*TENTER)
C
    7 ANEP = (ABURAN*.327E-6 + ABNEP*.966E-6)*FISNUM
      DO 8 J=1,ITAB
    8 FP(J) = FP(J) + ANEP*FMASS(J)
C
      IF (NPRNT(12)) WRITE (KOUT,100) ANEP
  100 FORMAT
```

```
     1     (15H1OUTPUT OF URAN/5X21HMASS 239 CONTRIBUTES 1PE12.4,
     2     23H TO EACH PARTICLE SIZE.)
      RETURN
      END
$IBFTC INDY    LIST,DECK,M94/2
      SUBROUTINE INDCD2
C
C     NOVEMBER 1966
      COMMON/INDUCE/
     1     ALBFOM       ,FAC    (7,18),FOGRNY(7,18),ISO    (18)
     2    ,LMAX         ,XLAM   (7,18)
C
      COMMON/UTILTY/
     1     KOUT         ,NPRNT (15)
C
      COMMON/OUTPUT/
     1     FISNUM       ,FP     (200) ,FW            ,ITAB          ,JGO
     2    ,MASCHN       ,SIGMAS
C
      COMMON/DECAY/
     1     IGO          ,JD            ,KDOS          ,TENTER
     2    ,TEXIT        ,TIME
C
      COMMON   /SET3/
     1     BZ             ,BZ2            ,BZZ            ,BZ22
     2    ,DELTAX         ,DGX            ,DGY            ,DIFCON
     3    ,DIFADJ         ,FMAS(500)      ,FMASS(200)     ,IC(18)
     4    ,ICON           ,ICTR           ,IH             ,IOT(18)
     5    ,IP             ,IPOUT          ,ITT(18)        ,IV
     6    ,JC(18)         ,JIN            ,JOUT           ,JPOUT
     7    ,KTR(500)       ,KTAPE          ,LAST           ,MAPRUN
     8    ,MARRAY         ,MIN            ,MXREQ
     9    ,MYDUMY         ,NA             ,NBZX           ,NBZX2
     1    ,NBZY           ,NCL            NE              ,NF
     2    ,NIJ            ,NMAP           ,NMAX           ,NOX
     3    ,NP(21)         ,NREQ           ,NS             ,NTAPES
     4    ,NTAPET         ,NTASK          ,NXMAP          ,NYMAP
     5    ,YMIN           ,PS(500)        ,PSIZE(200)     ,PACT(200)
     6    ,ROPART                         ,T(500)         ,T1
     7    ,T2             ,TLIMIT         ,X(500)         ,XF
     8    ,XO             ,XMAX           ,XMIN           ,XNMAP
     9    ,X1             ,X2             ,X3             ,X4
     1    ,Y(500)         ,YF             ,YO             ,YMAX
C
      LOGICAL JD,IGO,KDOS,NPRNT
C
 1000 FORMAT
     1     (17H1OUTPUT OF INDCD2/5X53HINDUCED ACTIVITY IN THE TRANSPORTED
     2 SOIL CONTRIBUTES 1PE12.4,23H TO EACH PARTICLE SIZE.)
C
      SDRE = 0.0
C
      DO 24 L = 1,LMAX
      IS = ISO(L)
C
      DO 22 I = 1,IS
      DLAM = -XLAM(I,L)
      IF (.NOT.JD) GO TO 12
      DRI = -FAC(I,L)*DLAM*FOGRNY(I,L)*EXP(DLAM*TIME)
      GO TO 22
```

```
C                                                                       INDY  56
   12 IF (.NOT.KDOS) GO TO 14                                           INDY  57
      DRI = FAC(I,L)*FOGRNY(I,L)*(EXP(DLAM*TENTER) - EXP(DLAM*TEXIT))   INDY  58
      GO TO 22                                                          INDY  59
C                                                                       INDY  60
   14 DRI = FAC(I,L)*FOGRNY(I,L)*EXP(DLAM*TENTER)                       INDY  61
C                                                                       INDY  62
   22 SDRE = SDRE + DRI                                                 INDY  63
   24 CONTINUE                                                          INDY  64
C                                                                       INDY  65
C                                                                       INDY  66
      SDRE = SDRE*ALBFOM*FISNUM                                         INDY  67
C                                                                       INDY  68
      DO 26 MA = 1,ITAB                                                 INDY  69
   26 FP(MA) = FP(MA) + SDRE*FMASS(MA)                                  INDY  70
C                                                                       INDY  71
      IF (NPRNT(11)) WRITE (KOUT,1000) SDRE                             INDY  72
      RETURN                                                            INDY  73
      END                                                               INDY  74
      RETURN                                                            INDY  73
$IBFTC MCTS     LIST,DECK,M94,2                                         MCTS   0
      SUBROUTINE MCHDEP                                                 MCTS   1
C                                                                       MCTS   2
C          R C TOMPKINS - US ARMY NUCLEAR DEFENSE LABS                  MCTS   3
C        NOVEMBER 1966                                                  MCTS   4
CALLED BY PAM2                                                          MCTS   5
C                                                                       MCTS   6
      COMMON/FISHIN/                                                    MCTS   7
     1    ABEGN (700) ,ABUNDO(700) ,BRANCH(130) ,CAPFIS                 MCTS   8
     2   ,DCON  (700) ,IBRA        ,INUC        ,MAXNUC                 MCTS   9
     3   ,MULT  (11)  ,NUCLID(700)                                      MCTS  10
      COMMON/UTILTY/                                                    MCTS  11
     1    KOUT        ,NPRNT (15)                                       MCTS  12
      COMMON/OUTPUT/                                                    MCTS  13
     1    FISNUM      ,FP    (200) ,FW          ,ITAB        ,JGO       MCTS  14
     2   ,MASCHN      ,SIGMAS                                           MCTS  15
      COMMON/FRYLNG/                                                    MCTS  16
     1    BSUBK (90)  ,ERM   (185) ,JRM   (185) ,KRM      ,ECF(90)      MCTS  17
      COMMON/DECAY/                                                     MCTS  18
     1    IGO         ,JD          ,KDOS        ,TENTER                 MCTS  19
     2   ,TEXIT       ,TIME                                             MCTS  20
      COMMON  /SET3/                                                    MCTS  21
     1    BZ           ,BZ2           ,BZZ           ,BZ22              MCTS  22
     2   ,DELTAX       ,DGX           ,DGY           ,DIFCON            MCTS  23
     3   ,DIFADJ       ,FMAS(500)     ,FMASS(200)    ,IC(18)            MCTS  24
     4   ,ICON         ,ICTR          ,IK            ,IOT(18)           MCTS  25
     5   ,IP           ,IPOUT         ,IT (18)       ,IV                MCTS  26
     6   ,JC(18)       ,JIN           ,JOUT          ,JPOUT             MCTS  27
     7   ,KTR(500)     ,KTAPE         ,LAST          ,MAPRUN            MCTS  28
     8   ,MARRAY       ,MIN           ,MXREQ                            MCTS  29
     9   ,MYDUMY       ,NA            ,NBZX          ,NBZX2             MCTS  30
     1   ,NBZY         ,NCL           ,NE            ,NF                MCTS  31
     2   ,NIJ          ,NMAP          ,NMAX          ,NOX               MCTS  32
     3   ,NP(21)       ,NREQ          ,NS            ,NTAPES            MCTS  33
     4   ,NTAPET       ,NTASK         ,NXMAP         ,NYMAP             MCTS  34
     5   ,YMIN         ,PS(500)       ,PSIZE(200)    ,PACT(200)         MCTS  35
     6   ,ROPART                      ,T(500)        ,T1                MCTS  36
     7   ,T2           ,TLIMIT        ,X(500)        ,XF                MCTS  37
     8   ,XO           ,XMAX          ,XMIN          ,XNMAP             MCTS  38
     9   ,X1           ,X2            ,X3            ,X4                MCTS  39
```

```
     1    ,Y(500)          ,YF              ,YO              ,YMAX
C
      DIMENSION FMTA(12),FMTB(18),UNITC(2),UNITF(2)
C
      LOGICAL NPRNT,TZERO,TMINUS
C
      DATA (FMTA(I),I=1,10)/6H(/14X3,6H1H TOT,6HAL ABU,6HNDANCE,6H OF MA
     1,6HSS CHA,6HIN I3,,6H4H WAS,6H1PE12.,6H4,  9H/
     2,(FMTB(I),I=1,15)/6H(17H10,6HUTPUT ,6HOF MCH,6HDEP///,6H5X13HP
     3,6HARTICL,6HE SIZE,6H6X22HA,6HCTIVIT,6HY OF M,6HASS CH,6HAIN14/
     4,6H8X7HMI,6HCRONS1,6H8X  9H/
     5,(UNITC(I),I=1,2)/6H CURIE,6HS  /) /
     6,(UNITF(I),I=1,2)/6H FISSI,6HONS/) /
      DATA CROSS,UNIT/100.0,1.0/
C
  903 FORMAT
     1    (5X1PE12.4,14XE12.4)
C
      TZERO = .FALSE.
      TMINUS = .FALSE.
      FMTA(11) = UNITC(1)
      FMTA(12) = UNITC(2)
      FMTB(16) = UNITC(1)
      FMTB(17) = UNITC(2)
      IF (TIME)11,1,2
    1 TZERO = .TRUE.
COMPUTE EQUIVALENT FISSIONS
      ABNDM = 1.0
      FISNUM = FISNUM*1.E4
      FMTA(11) = UNITF(1)
      FMTA(12) = UNITF(2)
      FMTB(16) = UNITF(1)
      FMTB(17) = UNITF(2)
    2 IF (NPRNT(13)) WRITE (KOUT,FMTB) MASCHN
      IF (TZERO) GO TO 10
COMPUTE ACTIVITY IN CURIES
      CALL BATMAN
      ABNDM = 0.0
      DO 220 K1=1,INUC
      IF(MASCHN.NE.IABS(NUCLID(K1))/MULT(9)) GO TO 220
C     SUM THE ACTIVITIES IN ONE MASS CHAIN AND CONVERT TO CURIES
      ABNDM = ABNDM + ABUNDO(K1)
  220 CONTINUE
      ABNDM = ABNDM/3.7E10
C
      IF (ABNDM)9,9,10
C     THE REST IS AN ABRIDGEMENT OF GXPSR
   10 BNEX = BSUBK(MASCHN-71)
      CRISS = CROSS**BNEX
      RADIAL = ECF(MASCHN-71)/(UNIT + CRISS*ECF(MASCHN-71))
      STRAIT = RADIAL*CRISS
      ABNDM = ABNDM*FISNUM
      DO 134 LD = 1,ITAB
      DSR = (RADIAL*PSIZE(LD)**BNEX + STRAIT)*ABNDM*FMASS(LD)
  134 FP(LD) =  FP(LD) + DSR
      IF (.NOT.NPRNT(13)) GO TO 9
      WRITE (KOUT,903)
     1    (PSIZE(I),FP(I),I=1,ITAB)
    9 WRITE (KOUT,FMTA) MASCHN,ABNDM
      RETURN
```

```
C  * *  * *  *  *  *  CODE INSERTION POINT  *  *  *  *  *  *  *  *        MCTS 100
C                                                                         MCTS 101
  11 TMINUS = .TRUE.                                                      MCTS 102
     RETURN                                                               MCTS 103
C                                                                         MCTS 104
C  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  MCTS 105
     END                                                                  MCTS 106
C  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  *  MCTS 105
     1     FISNUM       ,FP     (200) ,FW            ,ITAB         ,JGO   MCTS  14
     2 .  ,MASCHN       ,SIGMAS                                           MCTS  15
      COMMON/FRYLNG/                                                      MCTS  16
     1     BSUBK (90)   ,ERM    (185) ,JRM    (185) ,KRM      ,ECF(90)   MCTS  17
      COMMON/DECAY/                                                       MCTS  18
     1     IGO          ,JD            ,KDOS          ,TENTER             MCTS  19
     2    ,TEXIT        ,TIME                                             MCTS  20
      COMMON  /SET3/                                                      MCTS  21
     1     BZ                ,BZ2              ,BZZ              ,BZ22    MCTS  22
     2    ,DELTAX            ,DGX              ,DGY              ,DIFCON  MCTS  23
     3    ,DIFADJ            ,FMAS(500)        ,FMASS(200)       ,IC(18)  MCTS  24
     4    ,ICON              ,ICTR             ,IH               ,IOT(18) MCTS  25
     5    ,IP                ,IPOUT            ,ITT(18)          ,IV      MCTS  26
     6    ,JC(18)            ,JIN              ,JOUT             ,JPOUT   MCTS  27
     7    ,KTR(500)          ,KTAPE            ,LAST             ,MAPRUN  MCTS  28
     8    ,MARRAY            ,MIN              ,MXREQ                     MCTS  29
     9    ,MYDUMY            ,NA               ,NBZX             ,NBZX2   MCTS  30
     1    ,NBZY              ,NCL              ,NE               ,NF      MCTS  31
     2    ,NIJ               ,NMAP             ,NMAX             ,NOX     MCTS  32
     3    ,NP(21)            ,NREQ             ,NS               ,NTAPES  MCTS  33
     4    ,NTAPET            ,NTASK            ,NXMAP            ,NYMAP   MCTS  34
     5    ,YMIN              ,PS(500)          ,PSIZE(200)       ,PACT(200) MCTS  35
     6    ,ROPART                              ,T(500)           ,T1      MCTS  36
     7    ,T2                ,TLIMIT           ,X(500)           ,XF      MCTS  37
     8    ,X0                ,XMAX             ,XMIN             ,XNMAP   MCTS  38
     9    ,X1                ,X2               ,X3               ,X4      MCTS  39
     1    ,Y(500)            ,YF               ,YO               ,YMAX    MCTS  40
C                                                                         MCTS  41
      DIMENSION FMTA(12),FMTB(18),UNITC(2),UNITF(2)                       MCTS  42
C                                                                         MCTS  43
      LOGICAL NPRNT,TZERO,TMINUS                                          MCTS  44
C                                                                         MCTS  45
      DATA (FMTA(I),I=1,10)/6H(/14X3,6H1H TOT,6HAL ABU,6HNDANCE,6H OF MAMCTS  46
     1,6HSS CHA,6HIN (3,,6H4H WAS,6H1PE12.,6H4,  9H/                     MCTS  47
     2,(FMTB(I),I=1,15)/6H(17H10,6HUTPUT ,6HOF MCH,6HDEP///,6H5X13HP     MCTS  48
     3,6HARTICL,6HE SIZE,6H6X22HA,6HCTIVIT,6HY OF M,6HASS CH,6HAIN(4/    MCTS  49
     4,6H8X7HM),6HCRONS1,6H8X  9H/                                       MCTS  50
     5,(UNITC(I),I=1,2)/6H CURIE,6HS  /) /                               MCTS  51
     6,(UNITF(I),I=1,2)/6H FISSI,6HONS/) /                               MCTS  52
      DATA CROSS,UNIT/100.0,1.0/                                          MCTS  53
C                                                                         MCTS  54
  903 FORMAT                                                              MCTS  55
     1     (5X1PE12.4,14XE12.4)                                           MCTS  56
C                                                                         MCTS  57
      TZERO = .FALSE.                                                     MCTS  58
      TMINUS = .FALSE.                                                    MCTS  59
      FMTA(11) = UNITC(1)                                                 MCTS  60
      FMTA(12) = UNITC(2)                                                 MCTS  61
      FMTB(16) = UNITC(1)                                                 MCTS  62
      FMTB(17) = UNITC(2)                                                 MCTS  63
      IF (TIME)11,1,2                                                     MCTS  64
    1 TZERO = .TRUE.                                                      MCTS  65
```

```
COMPUTE EQUIVALENT FISSIONS
      ABNDM = 1.0
      FISNUM = FISNUM*1.E4
      FMTA(11) = UNITF(1)
      FMTA(12) = UNITF(2)
      FMTB(16) = UNITF(1)
      FMTB(17) = UNITF(2)
    2 IF (NPRNT(13)) WRITE (KOUT,FMTB) MASCHN
      IF (TZERO) GO TO 10
COMPUTE ACTIVITY IN CURIES
      CALL BATMAN
      ABNDM = 0.0
      DO 220 K1=1,INUC
      IF(MASCHN.NE.IABS(NUCLID(K1))/MULT(9)) GO TO 220
C     SUM THE ACTIVITIES IN ONE MASS CHAIN AND CONVERT TO CURIES
      ABNDM = ABNDM + ABUNDO(K1)
  220 CONTINUE
      ABNDM = ABNDM/3.7E10
C
      IF (ABNDM)9,9,10
C     THE REST IS AN ABRIDGEMENT OF GXPSR
   10 BNEX = BSUBK(MASCHN-71)
      CRISS = CROSS**BNEX
      RADIAL = ECF(MASCHN-71)/(UNIT + CRISS*ECF(MASCHN-71))
      STRAIT = RADIAL*CRISS
      ABNDM = ABNDM*FISNUM
      DO 134 LD = 1,ITAB
      DSR = (RADIAL*PSIZE(LD)**BNEX + STRAIT)*ABNDM*FMASS(LD)
  134 FP(LD) =  FP(LD) + DSR
      IF (.NOT.NPRNT(13)) GO TO 9
      WRITE (KOUT,903)
     1    (PSIZE(I),FP(I),I=1,ITAB)
    9 WRITE (KOUT,FMTA) MASCHN,ABNDM
      RETURN
C  * * * * * * *  CODE INSERTION POINT  * * * * * * * * *
C
   11 TMINUS = .TRUE.
      RETURN
C
C  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
      END
```

5.2 MULTIB

```
$IBFTC  MULTIB DECK M94/2.
C      9 MAR. 67    T.W.SCHWENKE  TECHNICAL OPERATIONS RESEARCH          MULT
C                                                                        MULT
C      THIS PROGRAM    COMBINES   TWO DELFIC MAPS OF IDENTICAL SIZE,SHAPEMULT
C      ,AND GRID INTERVALS AND EITHER PRINTS THE RESULTING MAP ,  WRITES MULT
C      IT OUT ONTO TAPE IN THE SAME FORMAT AND STRUCTURE AS THE INPUT    MULT
C      MAPS SO THAT OTHER MAPS MAY COMBINED WITH IT, OR BOTH WRITES AND  MULT
C      PRINTS IT.                                                        MULT
C                                                                        MULT
C      INPUT MAPS ARE TO BE ON TAPES PRODUCED BY DELFIC AND MOUNTED ON   MULT
C      LOGICAL UNITS 10 AND 11 OR THE UNITS SPECIFIED BY THE USER.  THE  MULT
C      SUMMED MAP TAPE , IF PRODUCED, WILL BE FOUND ON UNIT LOGICAL 9    MULT
C      OR THE UNIT SPECIFIED BY THE USER.                                MULT
C                                                                        MULT
C      SYSTEM INPUT AND OUTPUT UNITS ARE LOGICAL 5 AND 6 RESPECTIVELY.   MULT
C                                                                        MULT
C      THE STRUCTURE OF THE BINARY TAPES READ AND WRITTEN BY THIS PROGRAMMULT
C      ARE AS FOLLOWS..                                                  MULT
C                                                                        MULT
C       LOGICAL RECORD        CONTENT                                    MULT
C            1          IDENTIFICATION WORD LITERAL    (MULTIB)          MULT
C            2          MAP PARAMETERS                                   MULT
C            3          NUMBER OF NUMBER ROWS IN FOLLOWING MAP RECORD, ANDMULT
C                       NUMBER OR NUMBERS IN EACH ROW OF THE FOLLOWING MAPMULT
C                       STRIP..   NROWS,NUMBRS                           MULT
C            4          (NROWS) MAP RECORDS   (OMAP(J),J=1,NUMBRS)       MULT
C            5,6        AS 3,4 BUT FOR SECOND MAP STRIP                  MULT
C            7,8        AS 3,4 BUT FOR THIRD  MAP STRIP                  MULT
C            LAST       NROWS=0 NUMBRS=0                                 MULT
C                                                                        MULT
C ***********************************************************************MULT
C                                                                        MULT
      DIMENSION  OMAP(20),JMAP(20),TMAP(20),IC(18),XMIN(2),XMAX(2),      MULT
     1YMIN(2),YMAX(2),DGX(2),DGY(2),BMULTI(12)                           MULT
C                                                                        MULT
C ***********************************************************************MULT
C                                                                        MULT
 1    FORMAT(18I4)                                                       MULT
 2    FORMAT(12A6)                                                       MULT
 3    FORMAT(////1X,26HWRONG TAPE REEL ON LOGICAL,I5,49H.  PLEASE MOUNT  MULT
     1THE CORRECT REEL AND PRESS START,////1H )                          MULT
 4    FORMAT(///1X,12HWARNING ONLY,10X,77HMAP PARAMETERS FROM THE TWO INMULT
     1PUT TAPES DO NOT MATCH.  COMPUTATION CONTINUED.)                   MULT
 5    FORMAT(///1X,73HAN INDEX MISMATCH HAS BEEN ENCOUNTERED.  COMPUTATIMULT
     1ON CANNOT BE CONTINUED.)                                           MULT
 6    FORMAT(6H1STRIP,I4)                                                MULT
 7    FORMAT(////10X,12H NORMAL EXIT)                                    MULT
 8    FORMAT(/1X,19I6)                                                   MULT
 9    FORMAT(8X,19F6.3)                                                  MULT
 10   FORMAT(16H1ENTERING MULTIB)                                        MULT
 11   FORMAT(////36H CONTROL INTEGER ARRAY, IC(J),J=1,18/1X,18I4)        MULT
 12   FORMAT(F10.3,3I5 ,F10.3,10X,I5)                                    MULT
 13   FORMAT(//5X,2HC1,6X,12HM1   NOP  M2,5X,2HC2,14X,4HNDIS)            MULT
 14   FORMAT(1H1//20X,33HMAP TAPE PROCE  OR RUN IDENTIFIER//5X,12A6)     MULT
C                                                                        MULT
C ********************************  GLOSSARY  ***************************MULT
C     BIT UM         BC  LITERAL (MULTIB)                                MULT
C     BML TI( )      MULTIPLE BURST PROGRAM RUN IDENTIFIER               MULT
C     C1             CONSTANT TO BE MULTIPLIED BY EACH ORDINATE OF FIRST MULT
C                    MAP BEFORE MAP COMBINATION                          MULT
```

```
C       C2              FOR SECOND MAP.   SEE C1.                            MULT  60
C       DGX(J)          GRID INTERVAL IN X DIRECTION FOR MAP J               MULT  61
C       DGY(J)          FOR Y DIRECTION, SEE DGX(J)                          MULT  62
C       IC(J)           CONTROL INTEGER ARRAY                                MULT  63
C       IC(1)=0         GENERATE A PRINTED MAP ONLY                          MULT  64
C       IC(1)=1         GENERATE A TAPE MAP IMAGE ONLY                       MULT  65
C       IC(1)=2         GENERATE BOTH A PRINTED MAP AND A TAPE MAP IMAGE     MULT  66
C                                                                            MULT  67
C       IC(2)           LOGICAL NUMBER OF TAPE DRIVE HAVING THE FIRST MULTI- MULT  68
C                       PLE BURST TAPE.  IF IC(2) IS NOT SET, THE PROGRAM    MULT  69
C                       WILL USE LOGICAL 10.                                 MULT  70
C       IC(3)           LOGICAL NUMBER OF THE TAPE DRIVE HAVING THE SECOND MUMULT  71
C                       LTIPLE BURST TAPE.  IC(3) SET NEGATIVE IS USED TO    MULT  72
C                       INDICATE THAT ONLY ONE MULTIPLE BURST TAPE IS TO BE  MULT  73
C                       USED BY THE MULTIPLE BURST PROGRAM.                  MULT  74
C                       IF IC(3) IS SET TO ZERO, THE PROGRAM WILL EXPECT THE MULT  75
C                       SECOND MULTIPLE BURST TAPE ON LOGICAL 11.            MULT  76
C       IC(4)           NUMBER OF TAPE AVAILABLE FOR SCRATCH                 MULT  77
C       INT1            INITIAL VALUE OF IN1                                 MULT  78
C       INT2            INITIAL VALUE OF IN2                                 MULT  79
C       IN1             NUMBER OF TAPE CONTAINING 1ST MAP IMAGE              MULT  80
C       IN2             NUMBER OF TAPE CONTAINING 2ND MAP IMAGE              MULT  81
C       IOUT            LOGICAL NUMBER OF THE OUTPUT MAP TAPE                MULT  82
C       IPAS            FIRST PASS INDICATOR IF = 0                          MULT  83
C       IRROR           IRROR CONDITION IDENTIFIER.                          MULT  84
C       ISCRAT          SCRATCH TAPE NUMBER                                  MULT  85
C       ISIN            SYSTEM INPUT TAPE NUMBER                             MULT  86
C       ISOUT           SYSTEM OUTPUT TAPE NUMBER                            MULT  87
C       ISTRIP          COUNTER FOR MAP PRINTER STRIPS                       MULT  88
C       MBPROC          MULTIPLE BURST PROCESSING SUBROUTINE                 MULT  89
C       MISTK           MISTAKE INDICATOR (IF NON-ZERO)                      MULT  90
C       M1              SEQUENCE NUMBER TO IDENTIFY THE FIRST MAP IMAGE TO BEMULT  91
C                       USED                                                 MULT  92
C       M2              SEE M1.  FOR THE SECOND MAP IMAGE.  IF ONLY ONE      MULT  93
C                       MULTIPLE BURST TAPE IS TO BE USED AS INPUT, BOTH M1  MULT  94
C                       AND M2 REFER TO IT.   IF TWO INPUT (MULTIPLE BURST)  MULT  95
C                       TAPES ARE TO BE USED, M1 REFERS TO THE FIRST AND M2  MULT  96
C                       TO THE SECOND.                                       MULT  97
C       NDIS            DISPLAY OPTION PARAMETER.  IF NDIS.GE.1 IC(1) IS     MULT  98
C                       RESET TO NDIS-1                                      MULT  99
C       NOP             OPERATION IDENTIFICATION NUMBER                      MULT 100
C       NOP = 0         INDICATES THAT THERE ARE NO MORE DESIRED OPERATIONS  MULT 101
C       NOP = 1         ADD MAP 1 TO MAP 2 POINT BY POINT                    MULT 102
C       NOP = 2         SUBTRACT  (SEE NOP = 1)                              MULT 103
C       NOP = 3         MULTIPLY MAP 1 BY MAP 2 POINT BY POINT               MULT 104
C       NOP = 4         DIVIDE  (SEE NOP = 3)                                MULT 105
C       NOP = 5         OPERATE ONLY ON FIRST MAP TAPE                       MULT 106
C       NOP = 6,7,8 9 SPARES - NOT DEFINED                                   MULT 107
C       NOP .GE. 10   USE SPECIAL PROCESSING SUBROUTINE (MBPROC) TO PROCESSMULT 108
C                       MULTIPLE BURST TAPES.                                MULT 109
C       NPROC           PROCESSING BRANCHING PARAMETER                       MULT 110
C       NROWS           NUMBER OF ROWS OF NUMBERS (PRINTER LINES) IN CURRENT MULT 111
C                       MAP STRIP                                            MULT 112
C       NSKIP1          NUMBER OF MAP IMAGES THAT MUST BE SKIPPED OVER TO    MULT 113
C                       REACH THE MAP IDENTIFIED BY M1.                      MULT 114
C       NSKIP2          SEE NSKIP1.  FOR MAP M2.                             MULT 115
C       NSK1            NUMBER OF MAPS TO SKIP TO REACH FIRST MAP ON IN1     MULT 116
C       NSK2            NUMBER OF MAPS TO SKIP TO REACH SECOND MAP ON IN1    MULT 117
C                       AFTER FIRST MAP HAS BEEN READ.                       MULT 118
C       NUMBRS          NUMBER OF NUMBERS IN EACH ROW OF CURRENT PRINTER     MULT 119
```

```
C                  STRIP
C       OMAP( )    MAP STRIP ROW ARRAY FOR 1ST MAP
C       PROGRM     PROGRAM NAME (BCD)
C       SKIPF      SUBROUTINE FOR SKIPPING OVER MAP IMAGES
C       TMAP( )    MAP STRIP ROW ARRAY FOR 2ND MAP
C       XMIN(J)    X COORDINATE OF WESTERN EDGE OF AREA COVERED BY MAPJ
C       XMAX(J)    EASTERN EDGE, SEE XMIN(J)
C       YMIN(J)    SOUTHERN EDGE.  SEE XMIN(J).
C       YMAX(J)    NORTHERN EDGE.  SEE XMIN(J).
C
C
C ****************************************************************************
C
C       INITIALIZE
        DATA ISIN,ISOUT,IN1,IN2,IOUT,BITLUM,IPAS  ,MISTK,BIG,NUL
       1/5,14,38,39,9,6HMULTIB,0,0,1.0E+38,0/
C
C ****************************************************************************
C ****************************************************************************
C
        WRITE (ISOUT,10)
        READ (ISIN,1)(IC(J),J=1,18)
C
        WRITE (ISOUT,11)(IC(J),J=1,18)
        ISCRAT=IC(4)
        GO TO 3022
  3021  IF( IC(1).LT.1) GO TO 3022
        WRITE (IOUT)NUL,NUL
  3022  IF(IC(2))301,301,302
  302   IN1=IC(2)
  301   IF(IC(3))303,304,305
  305   IN2=IC(3)
  304   REWIND IN2
  303   REWIND IN1
        INT1=IN1
        INT2=IN2
C
C       READ A PROCESSING REQUEST CARD
        READ (ISIN,12)C1,M1,NOP,M2,C2,NDIS
        ISTRIP=0
        IF(C1.EQ.0.0 ) C1=1.0
        IF(C2.EQ.0.0)C2=1.0
C
C       TEST FOR NORMAL EXIT
        IF(NOP.LT.1) GOTO 200
        READ (ISIN,2) (BMULTI(J),J=1,12)
        WRITE (ISOUT,14) (BMULTI(J),J=1,12)
  306   WRITE (ISOUT,13)
        WRITE (ISOUT,12)C1,M1,NOP,M2,C2,NDIS
        IF(NDIS.GE.1) IC(1)=NDIS-1
C
C 307 BRANCH TO SET UP TRANSFERS FOR PROCESSING
        IF(NOP.GT.9) GO TO 308
        GO TO (331,332,333,334,335,336,336,336,336),NOP
  331   ASSIGN 1051 TO NPROC
        GO TO 309
  332   ASSIGN 1052 TO NPROC
        GO TO 309
  333   ASSIGN 1053 TO NPROC
        GO TO 309
```

```
 334   ASSIGN 1054 TO NPROC
       GO TO 309
 335   ASSIGN 1055 TO NPROC
       GO TO 309
 336   ASSIGN  105 TO NPROC
       GO TO 309
 308   ASSIGN 1060 TO NPROC
 309   CONTINUE
C
C      THIS CODE POSITIONS INPUT MAP TAPES BEFORE THE DESIRED MAP IMAGES
C      SO THAT THEY MAY BE COMBINED,  IF BOTH MAP IMAGES ARE TO BE READ
C      FROM THE SAME TAPE, ONE MAP IMAGE IS FIRST COPIED ONTO A SCRATCH
C      TAPE SINCE MAP IMAGES MUST BE COMBINED LINE BY LINE.
C
 310   NSKIP1=M1-1
       NSKIP2=M2-1
       IF(NSKIP1.GE.0) GO TO 312
 311   IRROR=-311
 7734  CALL ERROR(PROGRM,IRROR,ISOUT)
       DATA PROGRM/6HMULTIB/
 312   IF(NOP.EQ.5) GO TO 3012
       IF(NSKIP2.GE.0) GO TO 313
       IRROR=-312
       GO TO 7734
 3012   CALL SKIPP(INT1,NSKIP1,ISOUT)
       GO TO 100
C
C      BOTH SKIP NUMBERS ARE SATISFACTORY.  ARE BOTH MAPS COMING FROM
C      THE SAME TAPE.  NO TO 314
 313   IF(IC(3).GE.0) GO TO 314
       IF(NSKIP1.GE.NSKIP2) GO TO 315
       NSK2=NSKIP2-NSKIP1-1
       NSK1=NSKIP1
       IN1=ISCRAT
       IN2=INT1
       GO TO 316
 315   NSK2=NSKIP1-NSKIP2-1
       NSK1=NSKIP2
       IN2=ISCRAT
C
C 316  NOW SKIP TO POSITION FOR READING THE FIRST MAP
 316   CALL SKIPP (INT1,NSK1,ISOUT)
C
C      NOW COPY THE NEXT MAP ONTO SCRATCH TAPE
       REWIND ISCRAT
       READ (INT1)TST1
       WRITE (ISCRAT) TST1
       READ   (INT1)XMIN(1),XMAX(1),YMIN(1),YMAX(1),DGX(1),DGY(1)
       WRITE(ISCRAT)XMIN(1),XMAX(1),YMIN(1),YMAX(1),DGX(1),DGY(1)
 321   READ      (INT1) NROWS,NUMBRS
       WRITE (ISCRAT)NROWS,NUMBRS
C
C
C      END OF MAP TEST
       IF(NROWS.EQ. 0) GO TO 320
       DO 317 J=1,NROWS
       READ (INT1)(BMAP(K),K=1,NUMBRS)
 317   WRITE(ISCRAT)(BMAP(K),K=1,NUMBRS)
       GO TO 321
 320   REWIND ISCRAT
```

```
C
C 318 FIRST MAP IS COPIED [illegible] TO SCRAT
 318  IF(NSK2.GE.0) GO TO 319
      REWIND INT1
      NSK2  =NSK2+NSK1+1
      INT=IN1
 319  CALL SKIPP(INT1,NSK2,ISOUT)
      GO TO 100
C
C 314  THE MAPS ARE COMING FROM DIFFERENT TAPES
 314  CALL SKIPP(IN1,NSKIP1,ISOUT)
      CALL SKIPP(IN2,NSKIP2,ISOUT)
C
C     TAPES ARE POSITIONED AND PARAMETERS IN1 AND IN2 ARE SET TO ALLOW
C     THE READING OF MAP1 AND MAP2  RESPECTIVELY.  INT1 AND INT2 ARE TO
C     BE USED IN RESTORING THE ORIGINAL VALUES OF IN1 AND IN2.
C
C
C     CHECK IDENTIFIERS ON MAP TAPES
 100  READ (IN1)TST1
      IF(TST1.EQ. BITLUM) GO TO 101
      PRINT 3,IN1
      WRITE(ISOUT,3)IN1
      REWIND IN1
      PAUSE
      REWIND IN1
      GO TO 100
C
 101  IF(NOP.EQ.5) GO TO 102
      READ (IN2)TST1
      IF(TST1.EQ. BITLUM) GO TO 102
      PRINT  3,IN2
      WRITE (ISOUT,3) IN2
      REWIND IN2
      PAUSE
      REWIND IN2
      GO TO 101
C 102  AT THIS POINT BOTH INPUT MAP TAPES HAVE BEEN CHECKED AND ARE OK.
C     READ MAP PARAMETERS
C
 102  READ (IN1) XMIN(1),XMAX(1),YMIN(1),YMAX(1),DGX(1),DGY(1)
      IF(NOP.EQ.5) GO TO 1022
      READ (IN2) XMIN(2),XMAX(2),YMIN(2),YMAX(2),DGX(2),DGY(2)
 1022 IF(IC(1).LT.1)GO TO 1021
      IF(IPAS.NE.0) GO TO 1023
      IPAS = 1
C
C     PREPARE BEGINNING OF OUTPUT MAP TAPE
      REWIND IOUT
 1023 WRITE (IOUT)BITLUM
      WRITE (IOUT)XMIN(1),XMAX(1),YMIN(1),YMAX(1),DGX(1),DGY(1)
 1021 CONTINUE
      IF(NOP.EQ.5) GO TO 103
C
C     TEST FOR IDENTICAL MAP PARAMETERS
      IF(XMIN(1).NE.XMIN(2)) MISTK=1
      IF(XMAX(1).NE.XMAX(2)) MISTK=1
      IF(YMIN(1).NE.YMIN(2)) MISTK=1
      IF(YMAX(1).NE.YMAX(2)) MISTK=1
      IF(DGX(1) .NE. DGX(2)) MISTK=1
```

```
      IF(DGY(1) .NE. DGY(2)) MISTK=1
      IF(MISTK  .NE. 1) GO TO 103
C
C     A DISCREPANCY HAS BEEN DISCOVERED.  MAKE A WARNING COMMENT
      WRITE(ISOUT,4)
C
C 103 BEGIN MAP ADDITION.  FIRST READ LINE AND NUMBER INDICES FOR STRIP
 103  READ (IN1) NROWS,NUMBRS
C
C     ARE ALL STRIPS OF THE CURRENT MAP COMPLETED.  YES TO 3021
      IF(NROWS.LT.1) GO TO 3021
      IF(NOP.EQ.5) GO TO 104
 1031 READ (IN2) NROW2,NUMBR2
C
C     CHECK INDICES FOR MATCH
      MISTK=0
      IF(NROWS.NE.NROW2) MISTK=1
      IF(NUMBRS.NE.NUMBR2) MISTK=1
      IF(MISTK .NE. 1) GO TO 104
C
C     A MISMATCH HAS BEEN DISCOVERED.  COMPUTATION CANNOT BE CONTINUED.
      WRITE (ISOUT,5)
 201  REWIND IN1
      REWIND IN2
      IF(IC(1).GE.1) REWIND IOUT
      STOP
C
C 104 INDICES MATCH,  PROCESS A MAP STRIP ONE ROW AT A TIME
 104  IF(IC(1).LT.1) GO TO 109
      WRITE (IOUT) NROWS,NUMBRS
      IF(IC(1).EQ.1) GO TO 110
 109  ISTRIP=ISTRIP+1
      WRITE (ISOUT,6) ISTRIP
C
C     BEGIN LOOP TO PROCESS ONE PRINTER STRIP
 110  DO 108 NR=1,NROWS
      READ (IN1)(OMAP(J),J=1,NUMBRS)
      IF (NOP.EQ.5)  GO TO 1101
      READ (IN2)(TMAP(J),J=1,NUMBRS)
C
C     COMPUTE NUMBERS FOR ONE PRINTER ROW
 1101 DO 105 J=1,NUMBRS
      GO TO NPROC,(1051,1052,1053,1054,1055,1060,105)
 1051  OMAP(J)=C1*OMAP(J)+TMAP(J)*C2
      GO TO 105
 1052  OMAP(J)=C1*OMAP(J)-TMAP(J)*C2
      GO TO 105
 1053  OMAP(J)=C1*OMAP(J)*TMAP(J)*C2
      GO TO 105
 1054 IF(OMAP(J).EQ.0.0) GO TO 105
      IF(TMAP(J).EQ.0.0) GO TO 2054
      OMAP(J)=OMAP(J)*C1/(TMAP(J)*C2)
      GO TO 105
 2054 OMAP(J)=BIG
      GO TO 105
 1055  OMAP(J)=OMAP(J)*C1
      GO TO 105
 1060  CALL MBPROC (OMAP,TMAP,J,C1,NOP,C2,SPAR)
 105  CONTINUE
      IF(IC(1).LT.1) GO TO 106
```

```
      WRITE (ISOUT)(OMAP(J),J=1,NUMBRS)
C
C 106 PREPARE MAP LINE FOR PRINTER DISPLAY
C     CONVERT NUMBERS FOR ONE ROW INTO THE 2-LINE E FORMAT
C
      IF(IC(1).EQ.1) GO TO 108
  106 DO 107 J=1,NUMBRS
      IF(OMAP(J))115,116,117
  115 ASSIGN 121 TO N3
      OMAP(J)=-OMAP(J)
      GO TO 119
  117 ASSIGN 300 TO N3
  119 H=ALOG10(OMAP(J))
      H1=AMOD(H,1.0)
      JMAP(J)=H-H1
      IF(JMAP(J).EQ.0) JMAP(J)=0
      OMAP(J)=10.0**H1
      IF(OMAP(J)-9.999)125,125,1091
 1091 OMAP(J)=OMAP(J)/10.0
      JMAP(J)=JMAP(J)+1
      GO TO 125
  116 JMAP(J)=0
      GO TO 300
  125 GO TO N3,(300,121)
  121 OMAP(J)=-OMAP(J)
  300 CONTINUE
  107 CONTINUE
C
C     PRINT THE OUTPUT LINE
      WRITE (ISOUT,8)(JMAP(J),J=1,NUMBRS)
      WRITE (ISOUT,9)(OMAP(J),J=1,NUMBRS)
  108 CONTINUE
C     AT THIS POINT THE PROCESSING OF A PRINTER STRIP IS COMPLETE
      GO TO 103
C
C PREPARE TO EXIT AFTER COMPLETING THE MAP ADDITION
  200 WRITE (ISOUT,7)
      GO TO 201
      END
```

```
$IBFTC  SKIP DECK M94/2
      SUBROUTINE SKIP (NTAPE,NMAP,ISOUT)
C
C      T. W. SCHWENKE   6 MAR 67
C      THIS SUBROUTINE SKIPS OVER NMAP MAP IMAGES ON TAPE LOGICAL NTAPE
C
      DATA PROGRM/6H SKIPP/
      IF(NMAP)100,102,101
 100  IRROR=-100
 7734 CALL ERROR (PRCGRM,IRROR,ISOUT)
 101  DO 103 J=1,NMAP
      READ (NTAPE)D
      READ (NTAPE)D,D,D,D,D,D
 106  READ (NTAPE)NROWS,NUMBRS
      IF(NROWS.EQ.0) GO TO 103
      DO 105 K=1,NROWS
 105  READ (NTAPE)(D,L=1,NUMBRS)
      GO TO 106
 103  CONTINUE
 102  RETURN
      END

$IBFTC  MBPRO DECK M94/2
      SUBROUTINE MBPROC (OMAP,TMAP,J,C1,NOP,C2,SPAR)
C     DUMMY
      RETURN
      END

$IBFTC  ERRORX DECK M94/2
      SUBROUTINE ERROR (PROGRM,IRROR,ISOUT)
C     T. W. SCHWENKE  TECHNICAL OPERATIONS RESEARCH
C     1 MARCH 1966
C
C *********************************************************************
C
C     THIS PROGRAM WRITES A GENERALIZED ERROR COMMENT OF THE FOLLOWING
C     FORM ON TAPE ISOUT AND THEN RETURNS IF THE SIGN OF IRROR IS
C     POSITIVE OR STOPS IF ITS SIGN IS NEGATIVE.
C
C         ERROR SENSED IN PROGRAM (PROGRM) AT OR NEAR STATEMENT NUMBER
C         (IRROR).  PLEASE REFER TO THE PROGRAM LISTING.
C
C     PRIOR TO CALLING ERROR  THE PARAMETER  PROGRM  MUST BE SET
C                                 WITH THE BCD NAME OF THE CALLING
C     PROGRAM AND PARAMETER  IRROR  MUST BE SET WITH THE NUMBER OF THE
C     FORTRAN STATEMENT WHICH BEST IDENTIFIES THE ERROR CONDITION.
C
C *********************************************************************
C
 1    FORMAT(//26H ERROR SENSED IN PROGRAM  A6,30H  AT OR NEAR STATEMENT
     1 NUMBER I6,40H .  PLEASE REFER TO THE PROGRAM LISTING.)
C
C *********************************************************************
C *********************************************************************
C
      IRR= IABS(IRROR)
      WRITE (ISOUT,1)PROGRM,IRR
      IF(IRROR)101,100,100
  100 RETURN
  101 STOP
      END
```

6. SAMPLE INPUT/OUTPUT

6.1 Sample Input

```
 ISIN IS LOGICAL 5
USE MODULES 01 THRU 09
 SHORT TEST SET FOR THE DELFIC MODEL   26 JUN 67            INIT. COND.
    1

     2.0      3.048       1.0      0.314       4.0

 SHORT TEST SET FOR THE DELFIC MODEL   26 JUN 67            CLOUD RISE
  40  10    2    2    0    1    0    0
 938.1744                        ZBRSTZ
  2200.             SLDTMP
 1.0                  FW
 16764.                                                                  ZTRP
 2.6             DNS
 MODIFIED ARDS MODEL ATM.  - JULY SUB TROPICAL
 (2E12.5,12X,2E12.5/2E12.5,12X,E12.5,F1.1)                               FMT
                                                    .001                 SCLE 1
 10.                                                                     SCLE 2
```

1 2 5 3 7 4 6 8 ATMH SEQUENCE FOR SB

255 MODIFIED SUB-TROPICAL (JULY) STANDARD ATMOSPHERE

-0.10000E+04	0.29466E+03	0.10000E+01	0.13470E+01	0.18206E-04
0.11393E+04	0.98097E+03	0.10000E+01	0.25000E+02	
-0.80000E+03	0.29336E+03	0.10000E+01	0.13219E+01	0.18144E-04
0.11131E+04	0.98091E+03	0.10000E+01	0.25000E+02	
-0.60000E+03	0.29206E+03	0.10000E+01	0.12972E+01	0.18082E-04
0.10874E+04	0.98035E+03	0.10000E+01	0.25000E+02	
-0.40000E+03	0.29076E+03	0.10000E+01	0.12728E+01	0.18019E-04
0.10622E+04	0.98079E+03	0.10000E+01	0.25000E+02	
-0.20000E+03	0.28946E+03	0.10000E+01	0.12487E+01	0.17957E-04
0.10375E+04	0.98073E+03	0.10000E+01	0.25000E+02	
0.	0.30115E+03	0.10000E+01	0.11592E+01	0.18514E-04
0.10135E+04	0.98000E+03	0.10000E+01	0.25000E+02	
0.20000E+03	0.29965E+03	0.10000E+01	0.11406E+01	0.18443E-04
0.99173E+03	0.98000E+03	0.10000E+01	0.25800E+02	
0.40000E+03	0.29816E+03	0.10000E+01	0.11220E+01	0.18372E-04
0.96996E+03	0.98000E+03	0.10000E+01	0.26600E+02	
0.60000E+03	0.29666E+03	0.10000E+01	0.11034E+01	0.18301E-04
0.94819E+03	0.98000E+03	0.10000E+01	0.27400E+02	
0.80000E+03	0.29516E+03	0.10000E+01	0.10847E+01	0.18230E-04
0.92642E+03	0.98000E+03	0.10000E+01	0.28200E+02	
0.10000E+04	0.30348E+03	0.10000E+01	0.10279E+01	0.18624E-04
0.89543E+03	0.98000E+03	0.10000E+01	0.14388E+02	
0.12000E+04	0.29983E+03	0.10000E+01	0.10216E+01	0.18452E-04
0.87918E+03	0.98000E+03	0.10000E+01	0.15803E+02	
0.14000E+04	0.29816E+03	0.10000E+01	0.10064E+01	0.18373E-04
0.86139E+03	0.98000E+03	0.10000E+01	0.17186E+02	
0.16000E+04	0.29628E+03	0.10000E+01	0.99005E+00	0.18283E-04
0.84202E+03	0.98000E+03	0.10000E+01	0.18499E+02	
0.18000E+04	0.29411E+03	0.10000E+01	0.97250E+00	0.18180E-04
0.82202E+03	0.98000E+03	0.10000E+01	0.19811E+02	
0.20000E+04	0.29223E+03	0.10000E+01	0.95639E+00	0.18090E-04
0.80227E+03	0.98000E+03	0.10000E+01	0.21685E+02	
0.22000E+04	0.29035E+03	0.10000E+01	0.94029E+00	0.18000E-04
0.78368E+03	0.98000E+03	0.10000E+01	0.23653E+02	
0.24000E+04	0.28838E+03	0.10000E+01	0.92373E+00	0.17905E-04
0.76465E+03	0.98000E+03	0.10000E+01	0.25622E+02	
0.26000E+04	0.28697E+03	0.10000E+01	0.91509E+00	0.17837E-04
0.75379E+03	0.98000E+03	0.10000E+01	0.27241E+02	
0.28000E+04	0.28444E+03	0.10000E+01	0.89403E+00	0.17714E-04
0.72997E+03	0.98000E+03	0.10000E+01	0.32304E+02	
0.30000E+04	0.28247E+03	0.10000E+01	0.87841E+00	0.17618E-04
0.71229E+03	0.98000E+03	0.10000E+01	0.36897E+02	
0.32000E+04	0.28060E+03	0.10000E+01	0.86372E+00	0.17527E-04
0.69567E+03	0.98000E+03	0.10000E+01	0.41442E+02	
0.34000E+04	0.27854E+03	0.10000E+01	0.84815E+00	0.17426E-04
0.67813E+03	0.98000E+03	0.10000E+01	0.47084E+02	
0.36000E+04	0.27657E+03	0.10000E+01	0.83352E+00	0.17329E-04
0.66172E+03	0.98000E+03	0.10000E+01	0.51677E+02	
0.38000E+04	0.27508E+03	0.10000E+01	0.82046E+00	0.17256E-04
0.64784E+03	0.98000E+03	0.10000E+01	0.54832E+02	
0.40000E+04	0.27332E+03	0.10000E+01	0.80210E+00	0.17169E-04
0.62929E+03	0.98000E+03	0.10000E+01	0.49383E+02	
0.42000E+04	0.27181E+03	0.10000E+01	0.78804E+00	0.17094E-04
0.61485E+03	0.98000E+03	0.10000E+01	0.46102E+02	
0.44000E+04	0.27008E+03	0.10000E+01	0.77388E+00	0.17008E-04
0.59998E+03	0.98000E+03	0.10000E+01	0.45000E+02	
0.46000E+04	0.26640E+03	0.10000E+01	0.75955E+00	0.16725E-04
0.58518E+03	0.98000E+03	0.10000E+01	0.42651E+02	

0.48000E+04	0.26772E+03	0.10000E+01	0.74462E+00	0.1688[illegible]E-04
0.57221E+03	0.98000E+03	0.10000E+01	0.25865E+02	
0.50000E+04	0.26631E+03	0.10000E+01	0.72667E+00	0.16920E-[illegible]
0.55551E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.52000E+04	0.26522E+03	0.10000E+01	0.71151E+00	0.16786E-04
0.54167E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.54000E+04	0.26437E+03	0.10000E+01	0.69477E+00	0.16723E-04
0.52724E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.56000E+04	0.26355E+03	0.10000E+01	0.67882E+00	0.16682E-04
0.51355E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.58000E+04	0.26274E+03	0.10000E+01	0.66392E+00	0.16641E-04
0.50071E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.60000E+04	0.26110E+03	0.10000E+01	0.65062E+00	0.16558E-04
0.48765E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.62000E+04	0.25938E+03	0.10000E+01	0.63732E+00	0.16471E-04
0.47463E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.64000E+04	0.25761E+03	0.10000E+01	0.62492E+00	0.16380E-04
0.46238E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.66000E+04	0.25584E+03	0.10000E+01	0.61253E+00	0.16290E-04
0.45013E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.68000E+04	0.25406E+03	0.10000E+01	0.60013E+00	0.16200E-04
0.43789E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.70000E+04	0.25229E+03	0.10000E+01	0.58773E+00	0.16109E-04
0.42564E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.72000E+04	0.25092E+03	0.10000E+01	0.57613E+00	0.16039E-04
0.41505E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.74000E+04	0.24958E+03	0.10000E+01	0.56457E+00	0.15969E-04
0.40455E+03	0.98000E+03	0.10000E+01	0.00000E+00	
0.76000E+04	0.24823E+03	0.10000E+01	0.55301E+00	0.15900E-04
0.39405E+03	0.98000E+03	0.10000E+01	0.40000E+02	
0.78000E+04	0.24671E+03	0.10000E+01	0.54188E+00	0.15820E-04
0.38402E+03	0.98000E+03	0.10000E+01	0.40000E+02	
0.80000E+04	0.24516E+03	0.10000E+01	0.53079E+00	0.15739E-04
0.37405E+03	0.98000E+03	0.10000E+01	0.40000E+02	
0.82000E+04	0.24361E+03	0.10000E+01	0.51970E+00	0.15658E-04
0.36408E+03	0.98000E+03	0.10000E+01	0.39000E+02	
0.84000E+04	0.24206E+03	0.10000E+01	0.50861E+00	0.15577E-04
0.35410E+03	0.98000E+03	0.10000E+01	0.38000E+02	
0.86000E+04	0.24051E+03	0.10000E+01	0.49752E-00	0.15496E-04
0.34413E+03	0.98000E+03	0.10000E+01	0.37000E+02	
0.88000E+04	0.23896E+03	0.10000E+01	0.48643E-00	0.15415E-04
0.33416E+03	0.98000E+03	0.10000E+01	0.36000E+02	
0.90000E+04	0.23742E+03	0.10000E+01	0.47535E-00	0.15334E-04
0.32418E+03	0.98000E+03	0.10000E+01	0.35000E+02	
0.92000E+04	0.23591E+03	0.10000E+01	0.46455E-00	0.15255E-04
0.31465E+03	0.98000E+03	0.10000E+01	0.34000E+02	
0.94000E+04	0.23450E+03	0.10000E+01	0.45448E-00	0.15180E-04
0.30625E+03	0.98000E+03	0.10000E+01	0.33000E+02	
0.96000E+04	0.23310E+03	0.10000E+01	0.44442E-00	0.15105E-04
0.29785E+03	0.98000E+03	0.10000E+01	0.32000E+02	
0.98000E+04	0.23169E+03	0.10000E+01	0.43436E-00	0.15029E-04
0.28945E+03	0.98000E+03	0.10000E+01	0.31000E+02	
0.10000E+05	0.23029E+03	0.10000E+01	0.42430E-00	0.14954E-04
0.28105E+03	0.98000E+03	0.10000E+01	0.30000E+02	
0.10200E+05	0.22889E+03	0.10000E+01	0.41424E-00	0.14879E-04
0.27265E+03	0.98000E+03	0.10000E+01	0.30000E+02	
0.10400E+05	0.22748E+03	0.10000E+01	0.40418E-00	0.14804E-04
0.26426E+03	0.98000E+03	0.10000E+01	0.30000E+02	
0.10600E+05	0.226[illegible]E+03	0.10000E+01	0.39412E-00	0.14729E-04
0.25586E+03	0.98000E+03	0.10000E+01	0.30000E+02	

0.10800E+05	0.22476E+03	0.10000E+01	0.38443E-00	0.14658E-04
0.24607E+03	0.98000E+03	0.10000E+01	0.30000E+02	
0.11000E+05	0.22348E+03	0.10000E+01	0.37494E-00	0.14589E-04
0.24061E+03	0.98000E+03	0.10000E+01	0.30000E+02	
0.11200E+05	0.22221E+03	0.10000E+01	0.36545E-00	0.14520E-04
0.23315E+03	0.98000E+03	0.10000E+01	0.30000E+02	
0.11400E+05	0.22112E+03	0.10000E+01	0.35635E-00	0.14461E-04
0.22627E+03	0.98000E+03	0.10000E+01	0.30000E+02	
0.11600E+05	0.22028E+03	0.10000E+01	0.34773E-00	0.14414E-04
0.22011E+03	0.98000E+03	0.10000E+01	0.30000E+02	
0.11800E+05	0.21943E+03	0.10000E+01	0.33911E-00	0.14368E-04
0.21396E+03	0.98000E+03	0.10000E+01	0.30000E+02	
0.12000E+05	0.21859E+03	0.10000E+01	0.33048E-00	0.14322E-04
0.20780E+03	0.98000E+03	0.10000E+01	0.30000E+02	
0.12200E+05	0.21774E+03	0.10000E+01	0.32186E-00	0.14275E-04
0.20165E+03	0.98000E+03	0.10000E+01	0.28500E+02	
0.12400E+05	0.21690E+03	0.10000E+01	0.31324E-00	0.14229E-04
0.19549E+03	0.98000E+03	0.10000E+01	0.27000E+02	
0.12600E+05	0.21605E+03	0.10000E+01	0.30462E-00	0.14183E-04
0.18934E+03	0.98000E+03	0.10000E+01	0.25500E+02	
0.12800E+05	0.21521E+03	0.10000E+01	0.29600E-00	0.14136E-04
0.18318E+03	0.98000E+03	0.10000E+01	0.24000E+02	
0.13000E+05	0.21436E+03	0.10000E+01	0.28738E-00	0.14090E-04
0.17703E+03	0.98000E+03	0.10000E+01	0.22500E+02	
0.13200E+05	0.21352E+03	0.10000E+01	0.27875E-00	0.14044E-04
0.17087E+03	0.98000E+03	0.10000E+01	0.20980E+02	
0.13400E+05	0.21382E+03	0.10000E+01	0.26956E-00	0.14060E-04
0.16542E+03	0.98000E+03	0.10000E+01	0.19460E+02	
0.13600E+05	0.21431E+03	0.10000E+01	0.26027E-00	0.14087E-04
0.16009E+03	0.98000E+03	0.10000E+01	0.17940E+02	
0.13800E+05	0.21439E+03	0.10000E+01	0.25204E-00	0.14091E-04
0.15513E+03	0.98000E+03	0.10000E+01	0.16420E+02	
0.14000E+05	0.21387E+03	0.10000E+01	0.24528E-00	0.14063E-04
0.15066E+03	0.98000E+03	0.10000E+01	0.14900E+02	
0.14200E+05	0.21336E+03	0.10000E+01	0.23852E-00	0.14035E-04
0.14620E+03	0.98000E+03	0.10000E+01	0.14320E+02	
0.14400E+05	0.21285E+03	0.10000E+01	0.23176E-00	0.14006E-04
0.14174E+03	0.98000E+03	0.10000E+01	0.13740E+02	
0.14600E+05	0.21234E+03	0.10000E+01	0.22500E-00	0.13978E-04
0.13728E+03	0.98000E+03	0.10000E+01	0.13160E+02	
0.14800E+05	0.21183E+03	0.10000E+01	0.21825E-00	0.13950E-04
0.13282E+03	0.98000E+03	0.10000E+01	0.12580E+02	
0.15000E+05	0.21131E+03	0.10000E+01	0.21149E-00	0.13921E-04
0.12835E+03	0.98000E+03	0.10000E+01	0.12000E+02	
0.15200E+05	0.21080E+03	0.10000E+01	0.20473E-00	0.13893E-04
0.12389E+03	0.98000E+03	0.10000E+01	0.11400E+02	
0.15400E+05	0.21101E+03	0.10000E+01	0.19846E-00	0.13905E-04
0.12017E+03	0.98000E+03	0.10000E+01	0.10800E+02	
0.15600E+05	0.21141E+03	0.10000E+01	0.19230E-00	0.13926E-04
0.11662E+03	0.98000E+03	0.10000E+01	0.10200E+02	
0.15800E+05	0.21180E+03	0.10000E+01	0.18615E-00	0.13948E-04
0.11308E+03	0.98000E+03	0.10000E+01	0.96000E+01	
0.16000E+05	0.21220E+03	0.10000E+01	0.18000E-00	0.13970E-04
0.10954E+03	0.98000E+03	0.10000E+01	0.90000E+01	
0.16200E+05	0.21259E+03	0.10000E+01	0.17395E-00	0.13992E-04
0.10569E+03	0.98000E+03	0.10000E+01	0.90000E+01	
0.16400E+05	0.21298E+03	0.10000E 01	0.16770E-00	0.14014E-04
0.1024[illegible]E+03	0.98000E+03	0.10000E+01	0.90000E+01	
0.16600E+05	0.21338E+03	0.10000E+01	0.1625[illegible]-00	0.14036E-04
0.98900E+02	0.98000E+03	0.10000E+01	0.90000E+01	

0.16800E+05	0.21370E+03	0.10000E+01	0.15574E-00	0.14053E-04
0.95528E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.17000E+05	0.21368E+03	0.10000E+01	0.15146E-00	0.14053E-04
0.92903E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.17200E+05	0.21367E+03	0.10000E+01	0.14719E-00	0.14052E-04
0.90279E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.17400E+05	0.21366E+03	0.10000E+01	0.14292E-00	0.14051E-04
0.87654E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.17600E+05	0.21365E+03	0.10000E+01	0.13865E-00	0.14050E-04
0.85029E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.17800E+05	0.21363E+03	0.10000E+01	0.13438E-00	0.14050E-04
0.82405E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.18000E+05	0.21362E+03	0.10000E+01	0.13011E-00	0.14049E-04
0.79780E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.18200E+05	0.21361E+03	0.10000E+01	0.12584E-00	0.14048E-04
0.77155E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.18400E+05	0.21394E+03	0.10000E+01	0.12177E-00	0.14067E-04
0.74751E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.18600E+05	0.21454E+03	0.10000E+01	0.11787E-00	0.14100E-04
0.72520E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.18800E+05	0.21515E+03	0.10000E+01	0.11396E-00	0.14133E-04
0.70289E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.19000E+05	0.21575E+03	0.10000E+01	0.11006E-00	0.14166E-04
0.68058E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.19200E+05	0.21635E+03	0.10000E+01	0.10615E-00	0.14200E-04
0.65827E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.19400E+05	0.21696E+03	0.10000E+01	0.10225E-00	0.14233E-04
0.63596E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.19600E+05	0.21756E+03	0.10000E+01	0.98341E-01	0.14266E-04
0.61365E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.19800E+05	0.21816E+03	0.10000E+01	0.94436E-01	0.14299E-04
0.59134E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.20000E+05	0.21843E+03	0.10000E+01	0.91675E-01	0.14314E-04
0.57477E+02	0.98000E+03	0.10000E+01	0.90000E+01	
0.20200E+05	0.21219E+03		0.93182E-01	0.13970E-04
0.56742E+02	9.80000E+02	1.00000E+00	0.88500E+01	
0.20400E+05	0.21263E+03	0.10000E+01	0.90184E-01	0.13994E-04
0.55021E+02	0.98000E+03	0.10000E+01	0.87000E+01	
0.20600E+05	0.21306E+03	0.10000E+01	0.87185E-01	0.14018E-04
0.53300E+02	0.98000E+03	0.10000E+01	0.85500E+01	
0.20800E+05	0.21350E+03	0.10000E+01	0.84186E-01	0.14042E-04
0.51578E+02	0.98000E+03	0.10000E+01	0.84000E+01	
0.21000E+05	0.21393E+03	0.10000E+01	0.81187E-01	0.14067E-04
0.49857E+02	0.98000E+03	0.10000E+01	0.82500E+01	
0.21200E+05	0.21434E+03	0.10000E+01	0.78690E-01	0.14089E-04
0.48403E+02	0.98000E+03	0.10000E+01	0.81000E+01	
0.21400E+05	0.21474E+03	0.10000E+01	0.76193E-01	0.14111E-04
0.46948E+02	0.98000E+03	0.10000E+01	0.79500E+01	
0.21600E+05	0.21514E+03	0.10000E+01	0.73695E-01	0.14133E-04
0.45494E+02	0.98000E+03	0.10000E+01	0.78000E+01	
0.21800E+05	0.21554E+03	0.10000E+01	0.71198E-01	0.14155E-04
0.44039E+02	0.98000E+03	0.10000E+01	0.76500E+01	
0.22000E+05	0.21594E+03	0.10000E+01	0.68701E-01	0.14177E-04
0.42585E+02	0.98000E+03	0.10000E+01	0.75000E+01	
0.22200E+05	0.21633E+03	0.10000E+01	0.66607E-01	0.14199E-04
0.41353E+02	0.98000E+03	0.10000E+01	0.73500E+01	
0.22400E+05	0.21673E+03	0.10000E+01	0.64512E-01	0.14221E-04
0.40121E+02	0.98000E+03	0.10000E+01	0.72000E+01	
0.22600E+05	0.21713E+03	0.10000E+01	0.62418E-01	0.14242E-04
0.38889E+02	0.98000E+03	0.10000E+01	0.70500E+01	

0.22800E+05	0.21753E+03	0.10009E+01	0,60324E-01	0.14264E-04
0.37657E+02	0.98000E+03	0.10000E+01	0,69000E+01	
0.23000E+05	0.21792E+03	0.10000E+01	0,58229E-01	0.14286E-04
0.36426E+02	0.98000E+03	0.10000E+01	0,67500E+01	
0.23200E+05	0.21832E+03	0.10000E+01	0,56471E-01	0.14308E-04
0.35382E+02	0.98000E+03	0.10000E+01	0,66000E+01	
0.23400E+05	0.21871E+03	0.10000E+01	0,54712E-01	0.14329E-04
0.34338E 02	0.98000E+03	0.10000E+01	0,64500E 01	
0.23600E+05	0.21911E+03	0.10000E+01	0,52954E-01	0.14351E-04
0.33294E+02	0.98000E+03	0.10000E+01	0,63000E+01	
0.23800E+05	0.21951E+03	0.10000E+01	0,51195E-01	0.14373E-04
0.32250E+02	0.98000E+03	0.10000E+01	0,61500E+01	
0.24000E+05	0.21990E+03	0.10000E+01	0,49436E-01	0.14394E-04
0.31206E+02	0.98000E+03	0.10000E+01	0,60000E+01	
0.24200E+05	0.22030E+03	0.10000E+01	0,47955E-01	0.14416E-04
0.30319E+02	0.98000E+03	0.10000E+01	0,59000E+01	
0.24400E+05	0.22070E+03	0.10000E+01	0,46475E-01	0.14438E-04
0.29432E+02	0.98000E+03	0.10000E+01	0,58000E+01	
0.24600E+05	0.22109E+03	0.10000E+01	0,44994E-01	0.14459E-04
0.28546E+02	0.98000E+03	0.10000E+01	0,57000E+01	
0.24800E+05	0.22149E+03	0.10000E+01	0,43513E-01	0.14481E-04
0.27659E+02	0.98000E+03	0.10000E+01	0,56000E+01	
0.25000E+05	0.22189E+03	0.10000E+01	0,42032E-01	0.14502E-04
0.26772E+02	0.98000E+03	0.10000E+01	0,55000E+01	
0.25200E+05	0.22228E+03	0.10000E+01	0,40785E-01	0.14524E-04
0.26018E+02	0.98000E+03	0.10000E+01	0,54000E+01	
0.25400E+05	0.22268E+03	0.10000E+01	0,39537E-01	0.14545E-04
0.25264E+02	0.98000E+03	0.10000E+01	0,53000E+01	
0.25600E+05	0.22307E+03	0.10000E+01	0,38290E-01	0.14567E-04
0.24510E+02	0.98000E+03	0.10000E+01	0,52000E+01	
0.25800E+05	0.22347E+03	0.10000E+01	0,37042E-01	0.14588E-04
0.23756E+02	0.98000E+03	0.10000E+01	0,51000E+01	
0.26000E+05	0.22387E+03	0.10000E+01	0,35795E-01	0.14610E-04
0.23002E+02	0.98000E+03	0.10000E+01	0,50000E+01	
0.26200E+05	0.22426E+03	0.10000E+01	0,34740E-01	0.14631E-04
0.22359E+02	0.98000E+03	0.10000E+01	0,50000E+01	
0.26400E+05	0.22466E+03	0.10000E+01	0,33686E-01	0.14653E-04
0.21716E+02	0.98000E+03	0.10000E+01	0,50000E+01	
0.26600E+05	0.22506E+03	0.10000E+01	0,32631E-01	0.14674E-04
0.21073E+02	0.98000E+03	0.10000E+01	0,50000E+01	
0.26800E+05	0.22545E+03	0.10000E+01	0,31576E-01	0.14696E-04
0.20430E+02	0.93000E+03	0.10000E+01	0,50000E+01	
0.27000E+05	0.22585E+03	0.10000E+01	0,30521E-01	0.14717E-04
0.19787E+02	0.98000E+03	0.10000E+01	0,50000E+01	
0.27200E+05	0.22624E+03	0.10000E+01	0,29630E-01	0.14738E-04
0.19239E+02	0.98000E+03	0.10000E+01	0,50000E+01	
0.27400E+05	0.22664E+03	0.10000E+01	0,28739E-01	0.14760E-04
0.18691E+02	0.98000E+03	0.10000E+01	0,50000E+01	
0.27600E+05	0.22704E+03	0.10000E+01	0,27848E-01	0.14781E-04
0.18143E+02	0.98000E+03	0.10000E+01	0,50000E+01	
0.27800E+05	0.22743E+03	0.10000E+01	0,26956E-01	0.14802E-04
0.17594E+02	0.98000E+03	0.10000E+01	0,50000E+01	
0.28000E+05	0.22783E+03	0.10000E+01	0,26065E-01	0.14824E-04
0.17046E+02	0.98000E+03	0.10000E+01	0,50000E+01	
0.28200E+05	0.22822E+03	0.10000E+01	0,25311E-01	0.14845E-04
0.16578E+02	0.98000E+03	0.10000E+01	0,49000E+01	
0.28400E+05	0.22862E+03	0.10000E+01	0,24556E-01	0.14[illegible]66E-04
0.16110E+02	0.98000E+03	0.10000E+01	0,48000E+01	
0.28600E+05	0.22901E+03	0.10000E+01	0,23802E-01	0.14887E-04
0.15642E+02	0.98000E+03	0.10000E+01	0,47000E+01	

0.28800E+05	0.22941E+03	0.10000E+01	0.23048E-01	0.14909E-04
0.15174E+02	0.98000E+03	0.10000E+01	0.46000E+01	
0.29000E+05	0.22981E+03	0.10000E+01	0.22293E-01	0.14930E-04
0.14706E+02	0.98000E+03	0.10000E+01	0.45000E+01	
0.29200E+05	0.23020E+03	0.10000E+01	0.21653E-01	0.14951E-04
0.14305E+02	0.98000E+03	0.10000E+01	0.44000E+01	
0.29400E+05	0.23060E+03	0.10000E+01	0.21012E-01	0.14972E-04
0.13904E+02	0.98000E+03	0.10000E+01	0.43000E+01	
0.29600E+05	0.23097E+03	0.10000E+01	0.20371E-01	0.14993E-04
0.13503E+02	0.98000E+03	0.10000E+01	0.42000E+01	
0.29800E+05	0.23139E+03	0.10000E+01	0.19731E-01	0.15015E-04
0.13102E+02	0.98000E+03	0.10000E+01	0.41000E+01	
0.30000E+05	0.23179E+03	0.10000E+01	0.19090E-01	0.15036E-04
0.12701E+02	0.98000E+03	0.10000E+01	0.40000E+01	
0.30200E+05	0.23218E+03	0.10000E+01	0.18546E-01	0.15057E-04
0.12358E+02	0.98000E+03	0.10000E+01	0.40000E+01	
0.30400E+05	0.23258E+03	0.10000E+01	0.18002E-01	0.15078E-04
0.12015E+02	0.98000E+03	0.10000E+01	0.40000E+01	
0.30600E+05	0.23297E+03	0.10000E+01	0.17459E-01	0.15099E-04
0.11672E+02	0.98000E+03	0.10000E+01	0.40000E+01	
0.30800E+05	0.23337E+03	0.10000E+01	0.16915E-01	0.15120E-04
0.11329E+02	0.98000E+03	0.10000E+01	0.40000E+01	
0.31000E+05	0.23376E+03	0.10000E+01	0.16371E-01	0.15141E-04
0.10985E+02	0.98000E+03	0.10000E+01	0.40000E+01	
0.31200E+05	0.23416E+03	0.10000E+01	0.15908E-01	0.15162E-04
0.10691E+02	0.98000E+03	0.10000E+01	0.40000E+01	
0.31400E+05	0.23456E+03	0.10000E+01	0.15446E-01	0.15183E-04
0.10396E+02	0.98000E+03	0.10000E+01	0.40000E+01	
0.31600E+05	0.23495E+03	0.10000E+01	0.14983E-01	0.15204E-04
0.10102E+02	0.98000E+03	0.10000E+01	0.40000E+01	
0.31800E+05	0.23535E+03	0.10000E+01	0.14520E-01	0.15225E-04
0.98074E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.32000E+05	0.23574E+03	0.10000E+01	0.14058E-01	0.15246E-04
0.95128E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.32200E+05	0.23620E+03	0.10000E+01	0.13661E-01	0.15270E-04
0.92602E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.32400E+05	0.23666E+03	0.10000E+01	0.13264E-01	0.15295E-04
0.90075E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.32600E+05	0.23712E+03	0.10000E+01	0.12867E-01	0.15319E-04
0.87548E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.32800E+05	0.23757E+03	0.10000E+01	0.12470E-01	0.15343E-04
0.85021E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.33000E+05	0.23803E+03	0.10000E+01	0.12073E-01	0.15367E-04
0.82494E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.33200E+05	0.23851E+03	0.10000E+01	0.11735E-01	0.15392E-04
0.80322E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.33400E+05	0.23896E+03	0.10000E+01	0.11396E-01	0.15417E-04
0.78151E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.33600E+05	0.23945E+03	0.10000E+01	0.11058E-01	0.15442E-04
0.75980E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.33800E+05	0.23993E+03	0.10000E+01	0.10719E-01	0.15467E-04
0.73809E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.34000E+05	0.24040E+03	0.10000E+01	0.10381E-01	0.15492E-04
0.71638E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.34200E+05	0.24088E+03	0.10000E+01	0.10093E-01	0.15517E-04
0.69769E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.34400E+05	0.24135E+03	0.10000E+01	0.98043E-02	0.15542E-04
0.67901E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.34600E+05	0.24183E+03	0.10000E+01	0.95159E-02	0.15566E-04
0.66033E+01	0.98000E+03	0.10000E+01	0.40000E+01	

0.34800E+05	0.24230E+03	0.10000E+01	0.92276E-02	0.15591E-04
0.64165E+01	0.90000E+03	0.10000E+01	0.40000E+01	
0.35000E+05	0.24277E+03	0.10000E+01	0.89392E-02	0.15616E-04
0.62297E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.35200E+05	0.24325E+03	0.10000E+01	0.86931E-02	0.15641E-04
0.60667E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.35400E+05	0.24372E+03	0.10000E+01	0.84471E-02	0.15666E-04
0.59077E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.35600E+05	0.24420E+03	0.10000E+01	0.82010E-02	0.15690E-04
0.57467E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.35800E+05	0.24467E+03	0.10000E+01	0.79549E-02	0.15715E-04
0.55857E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.36000E+05	0.24514E+03	0.10000E+01	0.77089E-02	0.15740E-04
0.54247E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.36200E+05	0.24562E+03	0.10000E+01	0.74988E-02	0.15764E-04
0.52859E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.36400E+05	0.24609E+03	0.10000E+01	0.72687E-02	0.15789E-04
0.51471E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.36600E+05	0.24657E+03	0.10000E+01	0.70785E-02	0.15814E-04
0.50083E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.36800E+05	0.24704E+03	0.10000E+01	0.68684E-02	0.15838E-04
0.48695E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.37000E+05	0.24751E+03	0.10000E+01	0.66583E-02	0.15863E-04
0.47307E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.37200E+05	0.24799E+03	0.10000E+01	0.64785E-02	0.15887E-04
0.46108E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.37400E+05	0.24846E+03	0.10000E+01	0.62986E-02	0.15912E-04
0.44908E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.37600E+05	0.24894E+03	0.10000E+01	0.61187E-02	0.15936E-04
0.43708E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.37800E+05	0.24941E+03	0.10000E+01	0.59388E-02	0.15961E-04
0.42509E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.38000E+05	0.24988E+03	0.10000E+01	0.57590E-02	0.15985E-04
0.41309E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.38200E+05	0.25036E+03	0.10000E+01	0.56048E-02	0.16010E-04
0.40271E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.38400E+05	0.25083E+03	0.10000E+01	0.54506E-02	0.16034E-04
0.39232E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.38600E+05	0.25130E+03	0.10000E+01	0.52963E-02	0.16058E-04
0.38194E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.38800E+05	0.25178E+03	0.10000E+01	0.51421E-02	0.16083E-04
0.37156E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.39000E+05	0.25225E+03	0.10000E+01	0.49679E-02	0.16107E-04
0.36117E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.39200E+05	0.25273E+03	0.10000E+01	0.48557E-02	0.16131E-04
0.35218E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.39400E+05	0.25320E+03	0.10000E+01	0.47234E-02	0.16156E-04
0.34319E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.39600E+05	0.25367E+03	0.10000E+01	0.45911E-02	0.16180E-04
0.33420E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.39800E+05	0.25414E+03	0.10000E+01	0.44588E-02	0.16204E-04
0.32521E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.40000E+05	0.25462E+03	0.10000E+01	0.43265E-02	0.16228E-04
0.31622E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.40200E+05	0.25509E+03	0.10000E+01	0.42128E-02	0.16253E-04
0.30648E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.40400E+05	0.25556E+03	0.10000E+01	0.40990E-02	0.16277E-04
0.30868E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.40600E+05	0.25694E+03	0.10000E+01	0.39853E-02	0.16301E-04
0.29281E+01	0.98000E+03	0.10000E+01	0.40000E+01	

0.40800E+05	0.25651E+03	0.10000E+01	0.38715E-02	0.16325E-04
0.28501E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.41000E+05	0.25698E+03	0.10000E+01	0.37578E-02	0.16349E-04
0.27721E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.41200E+05	0.25746E+03	0.10000E+01	0.36598E-02	0.16373E-04
0.27042E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.41400E+05	0.25793E+03	0.10000E+01	0.35619E-02	0.16397E-04
0.26364E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.41600E+05	0.25840E+03	0.10000E+01	0.34639E-02	0.16421E-04
0.25686E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.41800E+05	0.25888E+03	0.10000E+01	0.33660E-02	0.16445E-04
0.25008E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.42000E+05	0.25935E+03	0.10000E+01	0.32680E-02	0.16469E-04
0.24330E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.42200E+05	0.25982E+03	0.10000E+01	0.31837E-02	0.16493E-04
0.23740E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.42400E+05	0.26030E+03	0.10000E+01	0.30993E-02	0.16517E-04
0.23150E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.42600E+05	0.26077E+03	0.10000E+01	0.30149E-02	0.16541E-04
0.22561E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.42800E+05	0.26124E+03	0.10000E+01	0.29305E-02	0.16565E-04
0.21971E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.43000E+05	0.26171E+03	0.10000E+01	0.28461E-02	0.16589E-04
0.21382E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.43200E+05	0.26219E+03	0.10000E+01	0.27732E-02	0.16613E-04
0.20868E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.43400E+05	0.26266E+03	0.10000E+01	0.27004E-02	0.16637E-04
0.20354E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.43600E+05	0.26313E+03	0.10000E+01	0.26275E-02	0.16661E-04
0.19840E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.43800E+05	0.26361E+03	0.10000E+01	0.25546E-02	0.16684E-04
0.19326E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.44000E+05	0.26408E+03	0.10000E+01	0.24817E-02	0.16708E-04
0.18813E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.44200E+05	0.26455E+03	0.10000E+01	0.24187E-02	0.16732E-04
0.18364E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.44400E+05	0.26502E+03	0.10000E+01	0.23557E-02	0.16756E-04
0.17916E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.44600E+05	0.26550E+03	0.10000E+01	0.22927E-02	0.16779E-04
0.17468E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.44800E+05	0.26597E+03	0.10000E+01	0.22297E-02	0.16803E-04
0.17020E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.45000E+05	0.26644E+03	0.10000E+01	0.21667E-02	0.16827E-04
0.16571E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.45200E+05	0.26692E+03	0.10000E+01	0.21122E-02	0.16850E-04
0.16180E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.45400E+05	0.26739E+03	0.10000E+01	0.20576E-02	0.16874E-04
0.15789E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.45600E+05	0.26786E+03	0.10000E+01	0.20031E-02	0.16898E-04
0.15398E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.45800E+05	0.26833E+03	0.10000E+01	0.19486E-02	0.16921E-04
0.15006E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.46000E+05	0.26880E+03	0.10000E+01	0.18941E-02	0.16945E-04
0.14615E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.46200E+05	0.26928E+03	0.10000E+01	0.18468E-02	0.16968E-04
0.14273E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.46400E+05	0.26975E+03	0.10000E+01	0.17995E-02	0.16992E-04
0.13930E+01	0.98000E+03	0.10000E+01	0.40000E+01	
0.46600E+05	0.27022E+03	0.10000E+01	0.17522E-02	0.17016E-04
0.13588E+01	0.98000E+03	0.10000E+01	0.40000E+01	

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0.46800E+05 0.27070E+03 0.10000E+01 0.17049E-02 0.17039E-04
0.13245E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.47000E+05 0.27117E+03 0.10000E+01 0.16576E-02 0.17063E-04
0.12902E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.47200E+05 0.27137E+03 0.10000E+01 0.16180E-02 0.17072E-04
0.12603E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.47400E+05 0.27156E+03 0.10000E+01 0.15784E-02 0.17082E-04
0.12303E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.47600E+05 0.27176E+03 0.10000E+01 0.15389E-02 0.17092E-04
0.12003E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.47800E+05 0.27195E+03 0.10000E+01 0.14993E-02 0.17102E-04
0.11703E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.48000E+05 0.27215E+03 0.10000E+01 0.14597E-02 0.17111E-04
0.11404E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.48200E+05 0.27215E+03 0.10000E+01 0.14258E-02 0.17111E-04
0.11139E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.48400E+05 0.27215E+03 0.10000E+01 0.13919E-02 0.17111E-04
0.10874E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.48600E+05 0.27215E+03 0.10000E+01 0.13580E-02 0.17111E-04
0.10609E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.48800E+05 0.27215E+03 0.10000E+01 0.13240E-02 0.17111E-04
0.10344E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.49000E+05 0.27215E+03 0.10000E+01 0.12901E-02 0.17111E-04
0.10079E+01 0.98000E+03 0.10000E+01 0.40000E+01
0.49200E+05 0.27215E+03 0.10000E+01 0.12602E-02 0.17111E-04
0.98446E+00 0.98000E+03 0.10000E+01 0.40000E+01
0.49400E+05 0.27215E+03 0.10000E+01 0.12302E-02 0.17111E-04
0.96106E+00 0.98000E+03 0.10000E+01 0.40000E+01
0.49600E+05 0.27215E+03 0.10000E+01 0.12003E-02 0.17111E-04
0.93766E+00 0.98000E+03 0.10000E+01 0.40000E+01
0.49800E+05 0.27215E+03 0.10000E+01 0.11703E-02 0.17111E-04
0.91426E+00 0.98000E+03 0.10000E+01 0.40000E+01
0.50000E+05 0.27215E+03 0.10000E+01 0.11403E-02 0.17111E-04
0.89086E+00 0.98000E+03 0.10000E+01 0.40000E+01
SHORT TEST SET FOR THE DELFIC MODEL   26 JUN 67            PSE
         1
1.000000E+06 1.000000E+06 0.0
  14
 914.400E+00    -0.632E+00     0.632E+00
1219.200E+00     0.387E+00    -0.224E+00
1524.000E+00     0.342E+00    -0.287E+00
1828.800E+00     0.447E+00    -0.774E+00
2133.600E+00     0.880E+00    -0.155E+00
2438.400E+00     2.940E+00     1.070E+00
2743.200E+00     5.420E+00     3.129E+00
3048.000E+00     6.968E+00     4.023E+00
3657.600E+00     3.484E+00     2.011E+00
4267.200E+00     3.484E+00     2.011E+00
4876.800E+00     3.484E+00     2.011E+00
5486.400E+00     7.043E+00    -1.242E+00
6096.000E+00    12.766E+00    -2.251E+00
99000.000E+00   12.766E+00    -2.251E+00
SHORT TEST SET FOR THE DELFIC MODEL   26 JUN 67            TRANSPORT
  1   1   1   0   0   0   1   1
 28800.0
 938.1744
TEST SET WINDFIELD
 28800.000    457.200  6115.000
   4   1
     838.2     4500.0  997750.0  997750.0 1029200.0 1024700.0
```

990.6	4500.0	997750.0	997750.0	1029208.0	1024700.0
1143.0	4500.0	997750.0	997750.0	1029208.0	1024700.0
1295.4	4500.0	997750.0	997750.0	1029200.0	1024700.0
1447.8	4500.0	997750.0	997750.0	1029200.0	1024700.0
1600.2	4500.0	997750.0	997750.0	1029200.0	1024700.0
1752.6	4500.0	997750.0	997750.0	1029200.0	1024700.0
1905.0	4500.0	997750.0	997750.0	1029200.0	1024700.0
2057.4	4500.0	997750.0	997750.0	1029200.0	1024700.0
2209.8	4500.0	997750.0	997750.0	1029200.0	1024700.0
2362.2	4500.0	997750.0	997750.0	1029200.0	1024700.0
2514.6	4500.0	997750.0	997750.0	1029200.0	1024700.0
2667.0	4500.0	997750.0	997750.0	1029200.0	1024700.0
2819.4	4500.0	997750.0	997750.0	1029200.0	1024700.0
2971.8	4500.0	997750.0	997750.0	1029200.0	1024700.0
3124.2	4500.0	997750.0	997750.0	1029200.0	1024700.0
3276.6	4500.0	997750.0	997750.0	1029200.0	1024700.0
3429.0	4500.0	997750.0	997750.0	1029200.0	1024700.0
3581.4	4500.0	997750.0	997750.0	1029200.0	1024700.0
3733.8	4500.0	997750.0	997750.0	1029200.0	1024700.0
3886.2	4500.0	997750.0	997750.0	1029200.0	1024700.0
4038.6	4500.0	997750.0	997750.0	1029200.0	1024700.0
4191.0	4500.0	997750.0	997750.0	1029200.0	1024700.0
4343.4	4500.0	997750.0	997750.0	1029200.0	1024700.0
4495.8	4500.0	997750.0	997750.0	1029200.0	1024700.0
4648.2	4500.0	997750.0	997750.0	1029200.0	1024700.0
4800.6	4500.0	997750.0	997750.0	1029200.0	1024700.0
4953.0	4500.0	997750.0	997750.0	1029200.0	1024700.0
5105.4	4500.0	997750.0	997750.0	1029200.0	1024700.0
5257.8	4500.0	997750.0	997750.0	1029200.0	1024700.0
5410.2	4500.0	997750.0	997750.0	1029200.0	1024700.0
5562.6	4500.0	997750.0	997750.0	1029200.0	1024700.0
5715.0	4500.0	997750.0	997750.0	1029200.0	1024700.0
5867.4	4500.0	997750.0	997750.0	1029200.0	1024700.0
6019.8	4500.0	997750.0	997750.0	1029200.0	1024700.0

999999.0

938.1744	1000000.0	1000000.0	0.43177	0.11569	0.0
1219.2	1000000.0	1000000.0	0.86354	0.23139	0.0
1524.0	1000000.0	1000000.0	1.72708	0.46277	0.0
1828.8	1000000.0	1000000.0	2.59062	0.69416	0.0
2133.6	1000000.0	1000000.0	3.45417	0.92554	0.0
2438.4	1000000.0	1000000.0	2.940	1.070	0.0
2743.2	1000000.0	1000000.0	5.420	3.129	0.0
3048.0	1000000.0	1000000.0	6.968	4.023	0.0
3657.6	1000000.0	1000000.0	3.484	2.011	0.0
4267.2	1000000.0	1000000.0	3.484	2.011	0.0
4876.8	1000000.0	1000000.0	3.484	2.011	0.0
5486.4	1000000.0	1000000.0	7.043	-1.247	0.0
6096.0	1000000.0	1000000.0	12.766	-2.251	0.0
1097.28	1007845.0	1001131.0	1.68017	-0.61153	0.0
1219.2	1007845.0	1001131.0	2.52025	-0.91730	0.0
1524.0	1007845.0	1001131.0	3.36033	-1.22307	0.0
1828.8	1007845.0	1001131.0	3.78037	-1. 7594	0.0
2133.6	1007845.0	1001131.0	3.36033	-1.22306	0.0
2438.4	1007845.0	1001131.0	2.940	1.070	0.0
2743.2	1007845.0	1001131.0	5.420	3.129	0.0
3048.0	1007845.0	1001131.0	6.968	4.023	0.0
3657.6	1007845.0	1001131.0	3.484	2.011	0.0
4267.2	1007845.0	1001131.0	3.484	2.011	0.0
4876.8	1007845.0	1001131.0	3.484	2.011	0.0
5486.4	1007845.0	1001131.0	7.043	-1.247	0.0

6096.0	1007845.0	1001131.0	12.766	-2.251	0.0
914.4	1014006.0	1004199.0	0.0	0.0	0.0
1341.12	1014006.0	1004199.0	1.14931	1.36968	0.0
1524.0	1014006.0	1004199.0	1.72396	2.05452	0.0
1828.8	1014006.0	1004199.0	2.58594	3.08178	0.0
2133.6	1014006.0	1004199.0	2.58594	3.08178	0.0
2438.4	1014006.0	1004199.0	3.58453	1.82640	0.0
2743.2	1014006.0	1004199.0	5.26657	2.45584	0.0
3048.0	1014006.0	1004199.0	6.53371	2.90900	0.0
3657.6	1014006.0	1004199.0	4.82111	2.35142	0.0
4267.2	1014006.0	1004199.0	3.87115	2.23500	0.0
4876.8	1014006.0	1004199.0	3.87115	2.23500	0.0
5486.4	1014006.0	1004199.0	7.12475	-0.62337	0.0
6096.0	1014006.0	1004199.0	10.88858	-2.51382	0.0
914.4	1017853.0	1008952.0	0.0	0.0	0.0
1219.2	1017853.0	1008952.0	0.0	0.0	0.0
1524.0	1017853.0	1008952.0	1.72396	2.05452	0.0
1828.8	1017853.0	1008952.0	2.38594	3.08178	0.0
2133.6	1017853.0	1008952.0	2.58594	3.08178	0.0
2438.4	1017853.0	1008952.0	3.58453	1.82640	0.0
2743.2	1017853.0	1008952.0	5.26657	2.45584	0.0
3048.0	1017853.0	1008952.0	6.53371	2.90900	0.0
3657.6	1017853.0	1008952.0	4.82111	2.35142	0.0
4267.2	1017853.0	1008952.0	3.87115	2.23500	0.0
4876.8	1017853.0	1008952.0	3.87115	2.23500	0.0
5486.4	1017853.0	1008952.0	7.12475	-0.62337	0.0
6096.0	1017853.0	1008952.0	10.88358	-2.51392	0.0
914.4	1023385.0	1013452.0	0.0	0.0	0.0
1219.2	1023385.0	1013452.0	0.0	1.788	0.0
1524.0	1023385.0	1013452.0	0.0	2.682	0.0
1828.8	1023385.0	1013452.0	0.0	4.023	0.0
2133.6	1023385.0	1013452.0	1.52883	4.20041	0.0
2438.400	1023385.0	1013452.025	4.076	2.750	0.
2743.200	1023385.0	1013452.025	4.590	1.762	0.
3048.000	1023385.0	1013452.025	5.101	1.658	0.
3352.800	1023385.0	1013452.025	5.461	1.987	0.
3657.600	1023385.0	1013452.025	5.842	2.243	0.
3962.400	1023385.0	1013452.025	4.938	2.096	0.
4267.200	1023385.0	1013452.025	4.258	2.458	0.
4572.000	1023385.0	1013452.025	3.978	2.890	0.
4876.800	1023385.0	1013452.025	4.258	2.458	0.
5181.600	1023385.0	1013452.025	5.181	1.388	0.
5406.400	1023385.0	1013452.025	6.704	0.117	0.
5791.200	1023385.0	1013452.025	7.924	-1.397	0.
6096.000	1023385.0	1013452.025	8.977	-2.745	0.
914.400	1026389.000	1019976.125	0.0	0.0	0.
1219.200	1026389.000	1019976.125	1.788	-0.031	0.
1524.000	1026389.000	1019976.125	2.249	1.461	0.
1828.800	1026389.000	1019976.125	3.255	2.365	0.
2133.600	1026389.000	1019976.125	3.424	2.873	0.
2438.400	1026389.000	1019976.125	4.076	2.750	0.
2743.200	1026389.000	1019976.125	4.598	1.762	0.
3048.000	1026389.000	1019976.125	5.101	1.658	0.
3352.800	1026389.000	1019976.125	5.461	1.987	0.
3657.600	1026389.000	1019976.125	5.842	2.243	0.
3962.400	1026389.000	1019976.125	4.938	2.096	0.
4267.200	1026389.000	1019976.125	4.258	2.458	0.
4572.000	1026389.000	1019976.125	3.978	2.890	0.
4876.800	[illegible]	1019976.125	4.258	2.458	0.
5181.600	1026389.000	1019976.125	5.181	1.388	0.

5486.400	1026389.000	1019976.125	6.704	0.117	0.
5791.200	1026389.000	1019976.125	7.924	-1.397	0.
6096.000	1026389.000	1019976.125	8.977	-2.745	0.
914.4	1005909.0	1010410.0	0.0	0.0	0.0
1219.2	1005909.0	1010410.0	0.0	0.0	0.0
1524.0	1005909.0	1010410.0	0.0	0.0	0.0
1828.8	1005909.0	1010410.0	0.0	0.0	0.0
2133.6	1005909.0	1010410.0	0.0	0.0	0.0
2438.4	1005909.0	1010410.0	2.940	1.070	0.0
2743.2	1005909.0	1010410.0	5.420	3.129	0.0
3048.0	1005909.0	1010410.0	6.968	4.023	0.0
3657.6	1005909.0	1010410.0	3.484	2.011	0.0
4267.2	1005909.0	1010410.0	3.484	2.011	0.0
4876.8	1005909.0	1010410.0	3.484	2.011	0.0
5486.4	1005909.0	1010410.0	7.043	-1.247	0.0
6096.0	1005909.0	1010410.0	12.766	-2.251	0.0
914.4	1000000.0	1019350.0	0.0	0.0	0.0
1219.2	1000000.0	1019350.0	0.0	0.0	0.0
1524.0	1000000.0	1019350.0	0.0	0.0	0.0
1828.8	1000000.0	1019350.0	0.0	0.0	0.0
2133.6	1000000.0	1019350.0	0.0	0.0	0.0
2438.4	1000000.0	1019350.0	2.940	1.070	0.0
2743.2	1000000.0	1019350.0	5.420	3.129	0.0
3048.0	1000000.0	1019350.0	6.968	4.023	0.0
3657.6	1000000.0	1019350.0	3.484	2.011	0.0
4267.2	1000000.0	1019350.0	3.484	2.011	0.0
4876.8	1000000.0	1019350.0	3.484	2.011	0.0
5486.4	1000000.0	1019350.0	7.043	-1.247	0.0
6096.0	1000000.0	1019350.0	12.766	-2.251	0.0
914.4	1013050.0	1019350.0	0.0	0.0	0.0
1219.2	1013050.0	1019350.0	0.0	0.0	0.0
1524.0	1013050.0	1019350.0	0.0	0.0	0.0
1828.8	1013050.0	1019350.0	0.0	0.0	0.0
2133.6	1013050.0	1019350.0	0.0	0.0	0.0
2438.400	1013050.0	1019350.0	4.076	2.750	0.
2743.200	1013050.0	1019350.025	4.590	1.762	0.
3048.000	1013050.0	1019350.025	5.101	1.658	0.
3352.800	1013050.0	1019350.025	5.461	1.987	0.
3657.600	1013050.0	1019350.025	5.842	2.243	0.
3962.400	1013050.0	1019350.025	4.938	2.096	0.
4267.200	1013050.0	1019350.025	4.258	2.458	0.
4572.000	1013050.0	1019350.025	3.978	2.890	0.
4876.800	1013050.0	1019350.025	4.258	2.458	0.
5181.600	1013050.0	1019350.025	5.181	1.388	0.
5486.400	1013050.0	1019350.025	6.704	0.117	0.
5791.200	1023385.0	1013452.025	7.924	-1.397	0.
6096.000	1013050.0	1019350.025	8.977	-2.745	0.
914.4	1026550.0	1000450.0	0.0	0.0	0.0
1219.2	1026550.0	1000450.0	0.0	0.0	0.0
1524.0	1026550.0	1000450.0	0.0	0.0	0.0
1828.8	1026550.0	1000450.0	0.0	0.0	0.0
2133.6	1026550.0	1000450.0	0.0	0.0	0.0
2438.4	1026550.0	1000450.0	3.58453	1.82640	0.0
2743.2	1026550.0	1000450.0	5.26657	2.45584	0.0
3048.0	1026550.0	1000450.0	6.53371	2.90900	0.0
3657.6	1026550.0	1000450.0	4.82111	2.35142	0.0
4267.2	1026550.0	1000450.0	3.87115	2.23500	0.0
4876.8	1026550.0	1000450.0	3.87115	2.23500	0.0
5486.4	1026550.0	1000450.0	7.12475	-0.62337	0.0
6096.0	1026550.0	1000450.0	10.88858	-2.51382	0.0

```
999999.0

END OF WINDFIELD
 SHORT TEST SET FOR THE DELFIC MODEL   26 JUN 67            OPP
   1   3   4  10
   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15   0   0   1
     2.0
  10   6
PARTICLE ACTIVITY MODULE       26 JUN 67
TT
 TTTTT TTTTTT T
     0.0       .1:4
P239ME
 1050000.0  998000.0 1015000.0  998000.0     1500.0     1500.0        .5
   1   2   3   4   5   6   7   8   9  10  11  12  13  14   0   0  17   0
   2
  10                        39
```

6.2 Sample Output

```
                                  * * * * * * * * * *
THE  DEPARTMENT  OF  DEFENSE  FALLOUT  PREDICTION  SYSTEM
                                  * * * * * * * * * *

                         INITIAL CONDITIONS (FIREBALL) MODULE

                                     PREPARED BY
                         TECHNICAL OPERATIONS RESEARCH,INC.
                                BURLINGTON, MASS.

     ****  INITIAL CONDITIONS IDENTIFICATION  ****
     SHORT TEST SET FOR THE DELFIC MODEL    26 JUN 67          INIT. COND.

     ****  INPUT PARAMETERS  ****
YIELD                                           0.20000E 01  KT
HEIGHT OR DEPTH OF BURST                        0.30480E 01  METERS
SOIL CATEGORY                                   SILICEOUS

PRE-SHOT SOIL PARTICLE SIZE FREQUENCY DISTRIBUTION
     A LOG-NORMAL DISTRIBUTION WITH -
          MEAN                                  0.31400E 00  MICRONS
          STANDARD DEVIATION                    0.40000E 01
     THIS DISTRIBUTION WAS SPECIFIED BY         THE USER

     ****  INITIAL CLOUD PROPERTIES AT H + 0.23791E 01 SECONDS  ****
AVERAGE GAS TEMPERATURE
                                                         0.25079E 04  DEGREES KELVIN
AVERAGE TEMPERATURE OF CONDENSED PHASE MATERIAL IN CLOUD 0.14151E 04  DEGREES KELVIN
MASS OF VAPORIZED SOIL IN CLOUD
                                                         0.00000E-38  KILOGRAMS
MASS OF CONDENSED PHASE MATERIAL IN CLOUD
                                                         0.15513E 07  KILOGRAMS
PARTICLE SIZE FREQUENCY DISTRIBUTION AT THE TIME OF INITIAL CONDITIONS SPECIFICATION
     THE DISTRIBUTION IS LOG-NORMAL WITH -
          MEAN                                  0.31400E 00  MICRONS
          STANDARD DEVIATION                    0.40000E 01
          MINIMUM PARTICLE DIAMETER            -0.00000E-38  MICRONS

                                  * * * * * * * * * *
LEAVING LINK 1
ENTERING LINK 2
```

THE DEPARTMENT OF DEFENSE FALLOUT PREDICTION SYSTEM

CLOUD-RISE MODULE

PREPARED BY
NAVAL RADIOLOGICAL DEFENSE LABORATORY
S.F.,CALIF.
AND
TECHNICAL OPERATIONS RESEARCH,INC.
BURLINGTON, MASS.

CLOUD RISE RUN IDENTIFICATION - SHORT TEST SET FOR THE DELFIC MODEL 26 JUN 67 CLOUD RISE

ATMOSPHERE IDENTIFICATION - MODIFIED ARDS MODEL ATM. - JULY SUB TROPICAL

```
ELEVATION OF GROUND ZERO =    938.2 METERS
SOIL SOLIDIFICATION TEMPERATURE =   2200.0 DEGREES KELVIN
ALTITUDE OF TROPOPAUSE =  16764.0 METERS
PARTICLE DENSITY (C.G.S.) =    2.6000
YIELDS (KT) -
   TOTAL =  0.2000E 01   FISSION =  0.1000E 01

COMPUTATICN CONTROL INPUTS-
     NEQ   NTVL    KDI   IRAD   KCLD    KRX    KEQ   IPAM
      40     10      2      2      0      1      0      0

CRM CCMPUTATION CONTRCLS -
   NUMBER OF PARTICLE SIZE CLASSES REQUESTED =   40
   PARTICLE GROWTH IS NOT REQUESTED

RSXP COMPUTATION CONTROLS -
   NUMBER OF PARTICLE SIZE CLASSES REQUESTED =   10
   NUMBER OF CLOUD SUBDIVISIONS(WAFERS) PER SIZE CLASS =    2
   WAFER SUBDIVISION FACTOR =    2
```

ATMOSPHERE

ALT	ATP	RHZ	ETA	PRS	GRV	SLM	RLH
-0.10000E 04	0.29466E 03	0.13470E-02	0.18206E-03	0.11393E 04	0.98097E 03	0.60323E-05	0.25000E 02
-0.80000E 03	0.29336E 03	0.13219E-02	0.18144E-03	0.11131E 04	0.98091E 03	0.61471E-05	0.25000E 02
-0.60000E 03	0.29206E 03	0.12972E-02	0.18082E-03	0.10874E 04	0.98085E 03	0.62645E-05	0.25000E 02
-0.40000E 03	0.29076E 03	0.12728E-02	0.18019E-03	0.10622E 04	0.98079E 03	0.63845E-05	0.25000E 02
-0.20000E 03	0.28946E 03	0.12487E-02	0.17957E-03	0.10375E 04	0.98073E 03	0.65073E-05	0.25000E 02
-0.00000E-38	0.30115E 03	0.11592E-02	0.18514E-03	0.10135E 04	0.98000E 03	0.69304E-05	0.25000E 02
0.20000E 03	0.29965E 03	0.11406E-02	0.18443E-03	0.99173E 03	0.98000E 03	0.70473E-05	0.25800E 02
0.40000E 03	0.29816E 03	0.11220E-02	0.18372E-03	0.96996E 03	0.98000E 03	0.71696E-05	0.26600E 02
0.60000E 03	0.29666E 03	0.11034E-02	0.18301E-03	0.94819E 03	0.98000E 03	0.72973E-05	0.27400E 02
0.80000E 03	0.29516E 03	0.10847E-02	0.18230E-03	0.92642E 03	0.98000E 03	0.74311E-05	0.28200E 02
0.10000E 04	0.30348E 03	0.10279E-02	0.18624E-03	0.89543E 03	0.98000E 03	0.79050E-05	0.14388E 02
0.12000E 04	0.29983E 03	0.10216E-02	0.18452E-03	0.87918E 03	0.98000E 03	0.79542E-05	0.15603E 02
0.14000E 04	0.29816E 03	0.10064E-02	0.18373E-03	0.86139E 03	0.98000E 03	0.80733E-05	0.17186E 02
0.16000E 04	0.29628E 03	0.99005E-03	0.18283E-03	0.84202E 03	0.98000E 03	0.82069E-05	0.18499E 02
0.18000E 04	0.29411E 03	0.97250E-03	0.18180E-03	0.82102E 03	0.98000E 03	0.83552E-05	0.19811E 02
0.20000E 04	0.29223E 03	0.95639E-03	0.18090E-03	0.80227E 03	0.98000E 03	0.84958E-05	0.21685E 02
0.22000E 04	0.29035E 03	0.94029E-03	0.18000E-03	0.78368E 03	0.98000E 03	0.86414E-05	0.23653E 02
0.24000E 04	0.28838E 03	0.92373E-03	0.17905E-03	0.76465E 03	0.98000E 03	0.87964E-05	0.25622E 02
0.26000E 04	0.28697E 03	0.91509E-03	0.17837E-03	0.75379E 03	0.98000E 03	0.88795E-05	0.27241E 02
0.28000E 04	0.28444E 03	0.89403E-03	0.17714E-03	0.72997E 03	0.98000E 03	0.90884E-05	0.32304E 02
0.30000E 04	0.28247E 03	0.87841E-03	0.17618E-03	0.71225E 03	0.98000E 03	0.92500E-05	0.36897E 02
0.32000E 04	0.28060E 03	0.86372E-03	0.17527E-03	0.69567E 03	0.98000E 03	0.94077E-05	0.41442E 02
0.34000E 04	0.27854E 03	0.84815E-03	0.17426E-03	0.67813E 03	0.98000E 03	0.95802E-05	0.47084E 02
0.36000E 04	0.27657E 03	0.83352E-03	0.17329E-03	0.66172E 03	0.98000E 03	0.97484E-05	0.51677E 02
0.38000E 04	0.27508E 03	0.82046E-03	0.17256E-03	0.64784E 03	0.98000E 03	0.99036E-05	0.54832E 02
0.40000E 04	0.27332E 03	0.80210E-03	0.17169E-03	0.62929E 03	0.98000E 03	0.10130E-04	0.49383E 02
0.42000E 04	0.27181E 03	0.78804E-03	0.17094E-03	0.61485E 03	0.98000E 03	0.10311E-04	0.46102E 02
0.44000E 04	0.27008E 03	0.77388E-03	0.17008E-03	0.59998E 03	0.98000E 03	0.10499E-04	0.45000E 02
0.46000E 04	0.26840E 03	0.75955E-03	0.16925E-03	0.58518E 03	0.98000E 03	0.10698E-04	0.42651E 02
0.48000E 04	0.26772E 03	0.74462E-03	0.16891E-03	0.57221E 03	0.98000E 03	0.10913E-04	0.25865E 02
0.50000E 04	0.26631E 03	0.72667E-03	0.16820E-03	0.55551E 03	0.98000E 03	0.11181E-04	0.00000E-38
0.52000E 04	0.26522E 03	0.71151E-03	0.16766E-03	0.54167E 03	0.98000E 03	0.11420E-04	0.00000E-38
0.54000E 04	0.26437E 03	0.69477E-03	0.16723E-03	0.52724E 03	0.98000E 03	0.11695E-04	0.00000E-38
0.56000E 04	0.26355E 03	0.67882E-03	0.16682E-03	0.51355E 03	0.98000E 03	0.11970E-04	0.00000E-38
0.58000E 04	0.26274E 03	0.66392E-03	0.16641E-03	0.50071E 03	0.98000E 03	0.12239E-04	0.00000E-38
0.60000E 04	0.26110E 03	0.65062E-03	0.16558E-03	0.48765E 03	0.98000E 03	0.12488E-04	0.00000E-38
0.62000E 04	0.25938E 03	0.63732E-03	0.16471E-03	0.47463E 03	0.98000E 03	0.12746E-04	0.00000E-38
0.64000E 04	0.25761E 03	0.62492E-03	0.16380E-03	0.46238E 03	0.98000E 03	0.12995E-04	0.00000E-38
0.66000E 04	0.25584E 03	0.61253E-03	0.16290E-03	0.45013E 03	0.98000E 03	0.13257E-04	0.00000E-38
0.68000E 04	0.25406E 03	0.60013E-03	0.16200E-03	0.43789E 03	0.98000E 03	0.13532E-04	0.00000E-38
0.70000E 04	0.25229E 03	0.58773E-03	0.16109E-03	0.42564E 03	0.98000E 03	0.13825E-04	0.00000E-38
0.72000E 04	0.25092E 03	0.57613E-03	0.16039E-03	0.41505E 03	0.98000E 03	0.14101E-04	0.00000E-38
0.74000E 04	0.24958E 03	0.56457E-03	0.15969E-03	0.40455E 03	0.98000E 03	0.14369E-04	0.00000E-38
0.76000E 04	0.24823E 03	0.55301E-03	0.15900E-03	0.39405E 03	0.98000E 03	0.14693E-04	0.40000E 02
0.78000E 04	0.24671E 03	0.54188E-03	0.15820E-03	0.38402E 03	0.98000E 03	0.14984E-04	0.40000E 02
0.80000E 04	0.24516E 03	0.53079E-03	0.15739E-03	0.37405E 03	0.98000E 03	0.15287E-04	0.40000E 02
0.82000E 04	0.24361E 03	0.51970E-03	0.15658E-03	0.36408E 03	0.98000E 03	0.15606E-04	0.39000E 02
0.84000E 04	0.24206E 03	0.50861E-03	0.15577E-03	0.35410E 03	0.98000E 03	0.15944E-04	0.38000E 02
0.86000E 04	0.24051E 03	0.49752E-03	0.15496E-03	0.34413E 03	0.98000E 03	0.16301E-04	0.37000E 02
0.88000E 04	0.23896E 03	0.48643E-03	0.15415E-03	0.33416E 03	0.98000E 03	0.16679E-04	0.36000E 02
0.90000E 04	0.23742E 03	0.47535E-03	0.15334E-03	0.32418E 03	0.98000E 03	0.17082E-04	0.35000E 02
0.92000E 04	0.23591E 03	0.46455E-03	0.15255E-03	0.31465E 03	0.98000E 03	0.17487E-04	0.34000E 02
0.94000E 04	0.23453E 03	0.45443E-03	0.15189E-03	0.30625E 03	0.98000E 03	0.17859E-04	0.33000E 02
0.96000E 04	0.23311E 03	0.44442E-03	0.15105E-03	0.29785E 03	0.98000E 03	0.18253E-04	0.32000E 02
0.98000E 04	0.23169E 03	0.43435E-03	0.15029E-03	0.28945E 03	0.98000E 03	0.18670E-04	0.31000E 02

0.10000E 05	0.23029E 03	0.42430E-03	0.14954E-03	0.28105E 03	0.98000E 03	0.19111E-04	0.30000E 02
0.10200E 05	0.22889E 03	0.41424E-03	0.14879E-03	0.27265E 03	0.98000E 03	0.19580E-04	0.30000E 02
0.10400E 05	0.22748E 03	0.40418E-03	0.14804E-03	0.26426E 03	0.98000E 03	0.20078E-04	0.30000E 02
0.10600E 05	0.22608E 03	0.39412E-03	0.14729E-03	0.25586E 03	0.98000E 03	0.20609E-04	0.30000E 02
0.10800E 05	0.22476E 03	0.38443E-03	0.14658E-03	0.24807E 03	0.98000E 03	0.21132E-04	0.30000E 02
0.11000E 05	0.22348E 03	0.37494E-03	0.14589E-03	0.24061E 03	0.98000E 03	0.21663E-04	0.30000E 02
0.11200E 05	0.22221E 03	0.36545E-03	0.14520E-03	0.23315E 03	0.98000E 03	0.22229E-04	0.30000E 02
0.11400E 05	0.22112E 03	0.35635E-03	0.14461E-03	0.22627E 03	0.98000E 03	0.22793E-04	0.30000E 02
0.11600E 05	0.22028E 03	0.34773E-03	0.14414E-03	0.22011E 03	0.98000E 03	0.23342E-04	0.30000E 02
0.11800E 05	0.21943E 03	0.33911E-03	0.14368E-03	0.21396E 03	0.98000E 03	0.23920E-04	0.30000E 02
0.12000E 05	0.21859E 03	0.33044E-03	0.14322E-03	0.20780E 03	0.98000E 03	0.24535E-04	0.30000E 02
0.12200E 05	0.21774E 03	0.32186E-03	0.14275E-03	0.20165E 03	0.98000E 03	0.25185E-04	0.28500E 02
0.12400E 05	0.21690E 03	0.31324E-03	0.14229E-03	0.19549E 03	0.98000E 03	0.25878E-04	0.27000E 02
0.12600E 05	0.21605E 03	0.30462E-03	0.14183E-03	0.18934E 03	0.98000E 05	0.26614E-04	0.25500E 02
0.12800E 05	0.21521E 03	0.29600E-03	0.14136E-03	0.18318E 03	0.98000E 03	0.27402E-04	0.24000E 02
0.13000E 05	0.21436E 03	0.28738E-03	0.14090E-03	0.17703E 03	0.98000E 03	0.28242E-04	0.22500E 02
0.13200E 05	0.21352E 03	0.27875E-03	0.14044E-03	0.17087E 03	0.98000E 03	0.29144E-04	0.20980E 02
0.13400E 05	0.21382E 03	0.26956E-03	0.14060E-03	0.16542E 03	0.98000E 03	0.30148E-04	0.19440E 02
0.13600E 05	0.21431E 03	0.26027E-03	0.14087E-03	0.16009E 03	0.98000E 03	0.31223E-04	0.17940E 02
0.13800E 05	0.21439E 03	0.25204E-03	0.14091E-03	0.15513E 03	0.98000E 03	0.32234E-04	0.16420E 02
0.14000E 05	0.21387E 03	0.24528E-03	0.14063E-03	0.15066E 03	0.98000E 03	0.33110E-04	0.14900E 02
0.14200E 05	0.21336E 03	0.23852E-03	0.14035E-03	0.14620E 03	0.98000E 03	0.34038E-04	0.14320E 02
0.14400E 05	0.21285E 03	0.23176E-03	0.14006E-03	0.14174E 03	0.98000E 03	0.35025E-04	0.13740E 02
0.14600E 05	0.21234E 03	0.22500E-03	0.13978E-03	0.13728E 03	0.98000E 03	0.36077E-04	0.13160E 02
0.14800E 05	0.21183E 03	0.21825E-03	0.13950E-03	0.13282E 03	0.98000E 03	0.37198E-04	0.12580E 02
0.15000E 05	0.21131E 03	0.21149E-03	0.13921E-03	0.12835E 03	0.98000E 03	0.38399E-04	0.12000E 02
0.15200E 05	0.21080E 03	0.20473E-03	0.13893E-03	0.12389E 03	0.98000E 03	0.39686E-04	0.11400E 02
0.15400E 05	0.21101E 03	0.19846E-03	0.13905E-03	0.12017E 03	0.98000E 03	0.40955E-04	0.10800E 02
0.15600E 05	0.21141E 03	0.19230E-03	0.13926E-03	0.11662E 03	0.98000E 03	0.42282E-04	0.10200E 02
0.15800E 05	0.21180E 03	0.18615E-03	0.13948E-03	0.11308E 03	0.98000E 03	0.43686E-04	0.96000E 01
0.16000E 05	0.21220E 03	0.18000E-03	0.13970E-03	0.10954E 03	0.98000E 03	0.45183E-04	0.90000E 01
0.16200E 05	0.21259E 03	0.17385E-03	0.13992E-03	0.10599E 03	0.98000E 03	0.46782E-04	0.90000E 01
0.16400E 05	0.21298E 03	0.16770E-03	0.14014E-03	0.10245E 03	0.98000E 03	0.48487E-04	0.90000E 01
0.16600E 05	0.21338E 03	0.16155E-03	0.14036E-03	0.98906E 02	0.98000E 03	0.50319E-04	0.90000E 01
0.16800E 05	0.21370E 03	0.15574E-03	0.14053E-03	0.93528E 02	0.98000E 03	0.52177E-04	0.90000E 01
0.17000E 05	0.21368E 03	0.15146E-03	0.14053E-03	0.92903E 02	0.98000E 03	0.53646E-04	0.90000E 01
0.17200E 05	0.21367E 03	0.14719E-03	0.14052E-03	0.90279E 02	0.98000E 03	0.55202E-04	0.90000E 01
0.17400E 05	0.21366E 03	0.14292E-03	0.14051E-03	0.87654E 02	0.98000E 03	0.56853E-04	0.90000E 01
0.17600E 05	0.21365E 03	0.13865E-03	0.14050E-03	0.85029E 02	0.98000E 03	0.58605E-04	0.90000E 01
0.17800E 05	0.21363E 03	0.13438E-03	0.14050E-03	0.82405E 02	0.98000E 03	0.60466E-04	0.90000E 01
0.18000E 05	0.21362E 03	0.13011E-03	0.14049E-03	0.79780E 02	0.98000E 03	0.62452E-04	0.90000E 01
0.18200E 05	0.21361E 03	0.12584E-03	0.14048E-03	0.77155E 02	0.98000E 03	0.64574E-04	0.90000E 01
0.18400E 05	0.21394E 03	0.12177E-03	0.14067E-03	0.74751E 02	0.98000E 03	0.66754E-04	0.90000E 01
0.18600E 05	0.21454E 03	0.11787E-03	0.14100E-03	0.72520E 02	0.98000E 03	0.69000E-04	0.90000E 01
0.18800E 05	0.21515E 03	0.11396E-03	0.14133E-03	0.70289E 02	0.98000E 03	0.71393E-04	0.90000E 01
0.19000E 05	0.21575E 03	0.11006E-03	0.14166E-03	0.68058E 02	0.98000E 03	0.73939E-04	0.90000E 01
0.19200E 05	0.21635E 03	0.10615E-03	0.14200E-03	0.65827E 02	0.98000E 03	0.76657E-04	0.90000E 01
0.19400E 05	0.21696E 03	0.10225E-03	0.14233E-03	0.63596E 02	0.98000E 03	0.79570E-04	0.90000E 01
0.19600E 05	0.21756E 03	0.98341E-04	0.14266E-03	0.61365E 02	0.98000E 03	0.82691E-04	0.90000E 01
0.19800E 05	0.21816E 03	0.94436E-04	0.14299E-03	0.59134E 02	0.98000E 03	0.86048E-04	0.90000E 01
0.20000E 05	0.21843E 03	0.91675E-04	0.14314E-03	0.57477E 02	0.98000E 03	0.88638E-04	0.90000E 01
0.20200E 05	0.21219E 03	0.93182E-04	0.13970E-03	0.56742E 02	0.98000E 03	0.87221E-04	0.88500E 01
0.20400E 05	0.21263E 03	0.90184E-04	0.13994E-03	0.55021E 02	0.98000E 03	0.90136E-04	0.87000E 01
0.20600E 05	0.21306E 03	0.87185E-04	0.14018E-03	0.53300E 02	0.98000E 03	0.93234E-04	0.85500E 01
0.20800E 05	0.21350E 03	0.84186E-04	0.14042E-03	0.51578E 02	0.98000E 03	0.96546E-04	0.84000E 01
0.21000E 05	0.21393E 03	0.81187E-04	0.14067E-03	0.49857E 02	0.98000E 03	0.10008E-03	0.82500E 01
0.21200E 05	0.21434E 03	0.78690E-04	0.14089E-03	0.48403E 02	0.98000E 03	0.10328E-03	0.81000E 01
0.21400E 05	0.21474E 03	0.76193E-04	0.14111E-03	0.46948E 02	0.98000E 03	0.10668E-03	0.79500E 01
0.21600E 05	0.21514E 03	0.73695E-04	0.14133E-03	0.45494E 02	0.98000E 03	0.11030E-03	0.78000E 01
0.21800E 05	0.21554E 03	0.71198E-04	0.14155E-03	0.44039E 02	0.98000E 03	0.11415E-03	0.76500E 01

0.22000E 05	0.21594E 03	0.68701E-04	0.14177E-03	0.42585E 02	0.98000E 03	0.11827E-03	0.75000E 01
0.22200E 05	0.21633E 03	0.66607E-04	0.14199E-03	0.41353E 02	0.98000E 03	0.12201E-03	0.73500E 01
0.22400E 05	0.21673E 03	0.64512E-04	0.14221E-03	0.40121E 02	0.98000E 03	0.12599E-03	0.72000E 01
0.22600E 05	0.21713E 03	0.62418E-04	0.14242E-03	0.38889E 02	0.98000E 03	0.13022E-03	0.70500E 01
0.22800E 05	0.21753E 03	0.60324E-04	0.14264E-03	0.37657E 02	0.98000E 03	0.13473E-03	0.69000E 01
0.23000E 05	0.21792E 03	0.58229E-04	0.14286E-03	0.36426E 02	0.98000E 03	0.13954E-03	0.67500E 01
0.23200E 05	0.21832E 03	0.56471E-04	0.14308E-03	0.35382E 02	0.98000E 03	0.14392E-03	0.66000E 01
0.23400E 05	0.21871E 03	0.54712E-04	0.14329E-03	0.34338E 02	0.98000E 03	0.14856E-03	0.64500E 01
0.23600E 05	0.21911E 03	0.52954E-04	0.14351E-03	0.33294E 02	0.98000E 03	0.15350E-03	0.63000E 01
0.23800E 05	0.21951E 03	0.51195E-04	0.14373E-03	0.32250E 02	0.98000E 03	0.15875E-03	0.61500E 01
0.24000E 05	0.21990E 03	0.49436E-04	0.14394E-03	0.31206E 02	0.98000E 03	0.16436E-03	0.60000E 01
0.24200E 05	0.22030E 03	0.47955E-04	0.14416E-03	0.30319E 02	0.98000E 03	0.16947E-03	0.59000E 01
0.24400E 05	0.22070E 03	0.46475E-04	0.14438E-03	0.29432E 02	0.98000E 03	0.17490E-03	0.58000E 01
0.24600E 05	0.22109E 03	0.44994E-04	0.14459E-03	0.28546E 02	0.98000E 03	0.18064E-03	0.57000E 01
0.24800E 05	0.22149E 03	0.43513E-04	0.14481E-03	0.27659E 02	0.98000E 03	0.18678E-03	0.56000E 01
0.25000E 05	0.22189E 03	0.42032E-04	0.14502E-03	0.26772E 02	0.98000E 03	0.19331E-03	0.55000E 01
0.25200E 05	0.22228E 03	0.40785E-04	0.14524E-03	0.26018E 02	0.98000E 03	0.19926E-03	0.54000E 01
0.25400E 05	0.22268E 03	0.39537E-04	0.14545E-03	0.25264E 02	0.98000E 03	0.20558E-03	0.53000E 01
0.25600E 05	0.22307E 03	0.38290E-04	0.14567E-03	0.24510E 02	0.98000E 03	0.21228E-03	0.52000E 01
0.25800E 05	0.22347E 03	0.37042E-04	0.14588E-03	0.23756E 02	0.98000E 03	0.21941E-03	0.51000E 01
0.26000E 05	0.22387E 03	0.35795E-04	0.14610E-03	0.23002E 02	0.98000E 03	0.22700E-03	0.50000E 01
0.26200E 05	0.22426E 03	0.34740E-04	0.14631E-03	0.22359E 02	0.98000E 03	0.23394E-03	0.50000E 01
0.26400E 05	0.22466E 03	0.33686E-04	0.14653E-03	0.21716E 02	0.98000E 03	0.24129E-03	0.50000E 01
0.26600E 05	0.22506E 03	0.32631E-04	0.14674E-03	0.21073E 02	0.98000E 03	0.24910E-03	0.50000E 01
0.26800E 05	0.22545E 03	0.31576E-04	0.14696E-03	0.20430E 02	0.98000E 03	0.25738E-03	0.50000E 01
0.27000E 05	0.22585E 03	0.30521E-04	0.14717E-03	0.19787E 02	0.98000E 03	0.26622E-03	0.50000E 01
0.27200E 05	0.22624E 03	0.29630E-04	0.14738E-03	0.19239E 02	0.98000E 03	0.27428E-03	0.50000E 01
0.27400E 05	0.22664E 03	0.28739E-04	0.14760E-03	0.18691E 02	0.98000E 03	0.28282E-03	0.50000E 01
0.27600E 05	0.22704E 03	0.27848E-04	0.14781E-03	0.18143E 02	0.98000E 03	0.29187E-03	0.50000E 01
0.27800E 05	0.22743E 03	0.26956E-04	0.14802E-03	0.17594E 02	0.98000E 03	0.30150E-03	0.50000E 01
0.28000E 05	0.22783E 03	0.26065E-04	0.14824E-03	0.17046E 02	0.98000E 03	0.31174E-03	0.50000E 01
0.28200E 05	0.22822E 03	0.25311E-04	0.14845E-03	0.16578E 02	0.98000E 03	0.32109E-03	0.49000E 01
0.28400E 05	0.22862E 03	0.24556E-04	0.14866E-03	0.16110E 02	0.98000E 03	0.33099E-03	0.48000E 01
0.28600E 05	0.22901E 03	0.23802E-04	0.14887E-03	0.15642E 02	0.98000E 03	0.34148E-03	0.47000E 01
0.28800E 05	0.22941E 03	0.23048E-04	0.14909E-03	0.15174E 02	0.98000E 03	0.35263E-03	0.46000E 01
0.29000E 05	0.22981E 03	0.22293E-04	0.14930E-03	0.14706E 02	0.98000E 03	0.36448E-03	0.45000E 01
0.29200E 05	0.23020E 03	0.21653E-04	0.14951E-03	0.14305E 02	0.98000E 03	0.37533E-03	0.44000E 01
0.29400E 05	0.23060E 03	0.21012E-04	0.14972E-03	0.13904E 02	0.98000E 03	0.38683E-03	0.43000E 01
0.29600E 05	0.23099E 03	0.20371E-04	0.14993E-03	0.13503E 02	0.98000E 03	0.39899E-03	0.42000E 01
0.29800E 05	0.23139E 03	0.19731E-04	0.15015E-03	0.13102E 02	0.98000E 03	0.41192E-03	0.41000E 01
0.30000E 05	0.23179E 03	0.19090E-04	0.15036E-03	0.12701E 02	0.98000E 03	0.42566E-03	0.40000E 01
0.30200E 05	0.23218E 03	0.18546E-04	0.15057E-03	0.12358E 02	0.98000E 03	0.43821E-03	0.40000E 01
0.30400E 05	0.23258E 03	0.18002E-04	0.15078E-03	0.12015E 02	0.98000E 03	0.45149E-03	0.40000E 01
0.30600E 05	0.23297E 03	0.17459E-04	0.15099E-03	0.11672E 02	0.98000E 03	0.46554E-03	0.40000E 01
0.30800E 05	0.23337E 03	0.16915E-04	0.15120E-03	0.11329E 02	0.98000E 03	0.48046E-03	0.40000E 01
0.31000E 05	0.23376E 03	0.16371E-04	0.15141E-03	0.10985E 02	0.98000E 03	0.49633E-03	0.40000E 01
0.31200E 05	0.23416E 03	0.15908E-04	0.15162E-03	0.10691E 02	0.98000E 03	0.51085E-03	0.40000E 01
0.31400E 05	0.23456E 03	0.15446E-04	0.15183E-03	0.10396E 02	0.98000E 03	0.52625E-03	0.40000E 01
0.31600E 05	0.23495E 03	0.14983E-04	0.15204E-03	0.10102E 02	0.98000E 03	0.54246E-03	0.40000E 01
0.31800E 05	0.23535E 03	0.14520E-04	0.15225E-03	0.98074E 01	0.98000E 03	0.55971E-03	0.40000E 01
0.32000E 05	0.23574E 03	0.14058E-04	0.15246E-03	0.95128E 01	0.98000E 03	0.57800E-03	0.40000E 01
0.32200E 05	0.23620E 03	0.13661E-04	0.15270E-03	0.92602E 01	0.98000E 03	0.5[illegible]492E-03	0.40000E 01
0.32400E 05	0.23666E 03	0.13264E-04	0.15295E-03	0.90075E 01	0.98000E 03	0.61[illegible]80E-03	0.40000E 01
0.32600E 05	0.23712E 03	0.12867E-04	0.15319E-03	0.87548E 01	0.98000E 03	0.63[illegible]E-03	0.40000E 01
0.32800E 05	0.23757E 03	0.12470E-04	0.15343E-03	0.85021E 01	0.98000E 03	0.65173E-03	0.40000E 01
0.33000E 05	0.23803E 03	0.12073E-04	0.15367E-03	0.82494E 01	0.98000E 03	0.67299E-03	0.40000E 01
0.33200E 05	0.23851E 03	0.11735E-04	0.15392E-03	0.80322E 01	0.98000E 03	0.69259E-03	0.40000E 01
0.33400E 05	0.23898E 03	0.11396E-04	0.15417E-03	0.78151E 01	0.98000E 03	0.71323E-03	0.40000E 01
0.33600E 05	0.23945E 03	0.11058E-04	0.15442E-03	0.75980E 01	0.98000E 03	0.73505E-03	0.40000E 01
0.33800E 05	0.23993E 03	0.10719E-04	.15467E-03	0.73809E 01	0.98000E 03	0.75819E-03	0.40000E 01

0.34000E 05	0.24040E 03	0.10381E-04	0.15492E-03	0.71638E 01	0.98000E 03	0.76269E-03	0.40000E 01
0.34200E 05	0.24088E 03	0.10093E-04	0.15517E-03	0.69769E 01	0.98000E 03	0.80527E-03	0.40000E 01
0.34400E 05	0.24135E 03	0.98043E-05	0.15542E-03	0.67901E 01	0.98000E 03	0.82903E-03	0.40000E 01
0.34600E 05	0.24183E 03	0.95159E-05	0.15566E-03	0.66033E 01	0.98000E 03	0.85418E-03	0.40000E 01
0.34800E 05	0.24230E 03	0.92276E-05	0.15591E-03	0.64165E 01	0.98000E 03	0.88076E-03	0.40000E 01
0.35000E 05	0.24277E 03	0.89392E-05	0.15616E-03	0.62297E 01	0.98000E 03	0.90893E-03	0.40000E 01
0.35200E 05	0.24325E 03	0.86931E-05	0.15641E-03	0.60687E 01	0.98000E 03	0.93409E-03	0.40000E 01
0.35400E 05	0.24372E 03	0.84471E-05	0.15666E-03	0.59077E 01	0.98000E 03	0.96222E-03	0.40000E 01
0.35600E 05	0.24420E 03	0.82010E-05	0.15690E-03	0.57467E 01	0.98000E 03	0.99112E-03	0.40000E 01
0.35800E 05	0.24467E 03	0.79549E-05	0.15715E-03	0.55857E 01	0.98000E 03	0.10217E-02	0.40000E 01
0.36000E 05	0.24514E 03	0.77089E-05	0.15740E-03	0.54247E 01	0.98000E 03	0.10540E-02	0.40000E 01
0.36200E 05	0.24562E 03	0.74988E-05	0.15764E-03	0.52859E 01	0.98000E 03	0.10838E-02	0.40000E 01
0.36400E 05	0.24609E 03	0.72887E-05	0.15789E-03	0.51471E 01	0.98000E 03	0.11150E-02	0.40000E 01
0.36600E 05	0.24657E 03	0.70785E-05	0.15814E-03	0.50083E 01	0.98000E 03	0.11483E-02	0.40000E 01
0.36800E 05	0.24704E 03	0.68684E-05	0.15838E-03	0.48695E 01	0.98000E 03	0.11832E-02	0.40000E 01
0.37000E 05	0.24751E 03	0.66583E-05	0.15863E-03	0.47307E 01	0.98000E 03	0.12203E-02	0.40000E 01
0.37200E 05	0.24799E 03	0.64785E-05	0.15887E-03	0.46108E 01	0.98000E 03	0.12545E-02	0.40000E 01
0.37400E 05	0.24846E 03	0.62986E-05	0.15912E-03	0.44908E 01	0.98000E 03	0.12904E-02	0.40000E 01
0.37600E 05	0.24894E 03	0.61187E-05	0.15936E-03	0.43708E 01	0.98000E 03	0.13284E-02	0.40000E 01
0.37800E 05	0.24941E 03	0.59388E-05	0.15961E-03	0.42509E 01	0.98000E 03	0.13689E-02	0.40000E 01
0.38000E 05	0.24988E 03	0.57590E-05	0.15985E-03	0.41309E 01	0.98000E 03	0.14109E-02	0.40000E 01
0.38200E 05	0.25036E 03	0.56048E-05	0.16010E-03	0.40271E 01	0.98000E 03	0.14500E-02	0.40000E 01
0.38400E 05	0.25083E 03	0.54506E-05	0.16034E-03	0.39232E 01	0.98000E 03	0.14914E-02	0.40000E 01
0.38600E 05	0.25130E 03	0.52963E-05	0.16058E-03	0.38194E 01	0.98000E 03	0.15344E-02	0.40000E 01
0.38800E 05	0.25178E 03	0.51421E-05	0.16083E-03	0.37156E 01	0.98000E 03	0.15805E-02	0.40000E 01
0.39000E 05	0.25225E 03	0.49879E-05	0.16107E-03	0.36117E 01	0.98000E 03	0.16290E-02	0.40000E 01
0.39200E 05	0.25273E 03	0.48557E-05	0.16131E-03	0.35218E 01	0.98000E 03	0.16738E-02	0.40000E 01
0.39400E 05	0.25320E 03	0.47234E-05	0.16156E-03	0.34319E 01	0.98000E 03	0.17208E-02	0.40000E 01
0.39600E 05	0.25367E 03	0.45911E-05	0.16180E-03	0.33420E 01	0.98000E 03	0.17704E-02	0.40000E 01
0.39800E 05	0.25414E 03	0.44588E-05	0.16204E-03	0.32521E 01	0.98000E 03	0.18227E-02	0.40000E 01
0.40000E 05	0.25462E 03	0.43265E-05	0.16228E-03	0.31622E 01	0.98000E 03	0.18780E-02	0.40000E 01
0.40200E 05	0.25509E 03	0.42128E-05	0.16253E-03	0.30842E 01	0.98000E 03	0.19291E-02	0.40000E 01
0.40400E 05	0.25556E 03	0.40990E-05	0.16277E-03	0.30062E 01	0.98000E 03	0.19828E-02	0.40000E 01
0.40600E 05	0.25604E 03	0.39853E-05	0.16301E-03	0.29281E 01	0.98000E 03	0.20395E-02	0.40000E 01
0.40800E 05	0.25651E 03	0.38715E-05	0.16325E-03	0.28501E 01	0.98000E 03	0.20992E-02	0.40000E 01
0.41000E 05	0.25698E 03	0.37578E-05	0.16349E-03	0.27721E 01	0.98000E 03	0.21622E-02	0.40000E 01
0.41200E 05	0.25746E 03	0.36598E-05	0.16373E-03	0.27042E 01	0.98000E 03	0.22206E-02	0.40000E 01
0.41400E 05	0.25793E 03	0.35619E-05	0.16397E-03	0.26364E 01	0.98000E 03	0.22819E-02	0.40000E 01
0.41600E 05	0.25840E 03	0.34639E-05	0.16421E-03	0.25686E 01	0.98000E 03	0.23464E-02	0.40000E 01
0.41800E 05	0.25888E 03	0.33660E-05	0.16445E-03	0.25008E 01	0.98000E 03	0.24145E-02	0.40000E 01
0.42000E 05	0.25935E 03	0.32680E-05	0.16469E-03	0.24330E 01	0.98000E 03	0.24863E-02	0.40000E 01
0.42200E 05	0.25982E 03	0.31837E-05	0.16493E-03	0.23740E 01	0.98000E 03	0.25527E-02	0.40000E 01
0.42400E 05	0.26030E 03	0.30993E-05	0.16517E-03	0.23150E 01	0.98000E 03	0.26226E-02	0.40000E 01
0.42600E 05	0.26077E 03	0.30149E-05	0.16541E-03	0.22561E 01	0.98000E 03	0.26959E-02	0.40000E 01
0.42800E 05	0.26124E 03	0.29305E-05	0.16565E-03	0.21971E 01	0.98000E 03	0.27733E-02	0.40000E 01
0.43000E 05	0.26171E 03	0.28461E-05	0.16589E-03	0.21382E 01	0.98000E 03	0.28548E-02	0.40000E 01
0.43200E 05	0.26219E 03	0.27732E-05	0.16613E-03	0.20868E 01	0.98000E 03	0.29305E-02	0.40000E 01
0.43400E 05	0.26266E 03	0.27004E-05	0.16637E-03	0.20354E 01	0.98000E 03	0.30099E-02	0.40000E 01
0.43600E 05	0.26313E 03	0.26275E-05	0.16661E-03	0.19840E 01	0.98000E 03	0.30934E-02	0.40000E 01
0.43800E 05	0.26361E 03	0.25546E-05	0.16684E-03	0.19326E 01	0.98000E 03	0.31814E-02	0.40000E 01
0.44000E 05	0.26408E 03	0.24817E-05	0.16708E-03	0.18813E 01	0.98000E 03	0.32740E-02	0.40000E 01
0.44200E 05	0.26455E 03	0.24187E-05	0.16732E-03	0.18364E 01	0.98000E 03	0.33600E-02	0.40000E 01
0.44400E 05	0.26502E 03	0.23557E-05	0.16756E-03	0.17916E 01	0.98000E 03	0.34502E-02	0.40000E 01
0.44600E 05	0.26550E 03	0.22927E-05	0.16779E-03	0.17468E 01	0.98000E 03	0.35451E-02	0.40000E 01
0.44800E 05	0.26597E 03	0.22297E-05	0.16803E-03	0.17020E 01	0.98000E 03	0.36448E-02	0.40000E 01
0.45000E 05	0.26644E 03	0.21667E-05	0.16827E-03	0.16571E 01	0.98000E 03	0.37502E-02	0.40000E 01
0.45200E 05	0.26692E 03	0.21122E-05	0.16850E-03	0.16180E 01	0.98000E 03	0.38477E-02	0.40000E 01
0.45400E 05	0.26739E 03	0.20576E-05	0.16874E-03	0.15789E 01	0.98000E 03	0.39500E-02	0.40000E 01
0.45600E 05	0.26786E 03	0.20031E-05	0.16896E-03	0.15398E 01	0.98000E 03	0.40574E-02	0.40000E 01
0.45800E 05	0.26833E 03	0.19486E-05	0.16921E-03	0.15006E 01	0.98000E 03	0.41707E-02	0.40000E 01

0.46000E 05	0.26880E 03	0.18941E-05	0.16945E-03	0.14615E 01	0.98000E 03	0.42897E-02	0.40000E 01
0.46200E 05	0.26928E 03	0.18468E-05	0.16968E-03	0.14773E 01	0.98000E 03	0.44004E-02	0.40000E 01
0.46400E 05	0.26975E 03	0.17995E-05	0.16992E-03	0.13930E 01	0.98000E 03	0.45166E-02	0.40000E 01
0.46600E 05	0.27022E 03	0.17522E-05	0.17016E-03	0.13588E 01	0.98000E 03	0.46383E-02	0.40000E 01
0.46800E 05	0.27070E 03	0.17049E-05	0.17039E-03	0.13245E 01	0.98000E 03	0.47669E-02	0.40000E 01
0.47000E 05	0.27117E 03	0.16576E-05	0.17063E-03	0.12902E 01	0.98000E 03	0.49021E-02	0.40000E 01
0.47200E 05	0.27137E 03	0.16180E-05	0.17072E-03	0.12603E 01	0.98000E 03	0.50221E-02	0.40000E 01
0.47400E 05	0.27156E 03	0.15784E-05	0.17082E-03	0.12303E 01	0.98000E 03	0.51482E-02	0.40000E 01
0.47600E 05	0.27176E 03	0.15389E-05	0.17092E-03	0.12003E 01	0.98000E 03	0.52808E-02	0.40000E 01
0.47800E 05	0.27195E 03	0.14993E-05	0.17102E-03	0.11703E 01	0.98000E 03	0.54199E-02	0.40000E 01
0.48000E 05	0.27215E 03	0.14597E-05	0.17111E-03	0.11404E 01	0.98000E 03	0.55661E-02	0.40000E 01
0.48200E 05	0.27215E 03	0.14258E-05	0.17111E-03	0.11139E 01	0.98000E 03	0.56985E-02	0.40000E 01
0.48400E 05	0.27215E 03	0.13919E-05	0.17111E-03	0.10874E 01	0.98000E 03	0.58374E-02	0.40000E 01
0.48600E 05	0.27215E 03	0.13580E-05	0.17111E-03	0.10609E 01	0.98000E 03	0.59832E-02	0.40000E 01
0.48800E 05	0.27215E 03	0.13240E-05	0.17111E-03	0.10344E 01	0.98000E 03	0.61365E-02	0.40000E 01
0.49000E 05	0.27215E 03	0.12901E-05	0.17111E-03	0.10079E 01	0.98000E 03	0.62978E-02	0.40000E 01
0.49200E 05	0.27215E 03	0.12602E-05	0.17111E-03	0.98446E 00	0.98000E 03	0.64478E-02	0.40000E 01
0.49400E 05	0.27215E 03	0.12302E-05	0.17111E-03	0.96106E 00	0.98000E 03	0.66048E-02	0.40000E 01
0.49600E 05	0.27215E 03	0.12003E-05	0.17111E-03	0.93766E 00	0.98000E 03	0.67696E-02	0.40000E 01
0.49800E 05	0.27215E 03	0.11703E-05	0.17111E-03	0.91626E 00	0.98000E 03	0.69429E-02	0.40000E 01
0.50000E 05	0.27215E 03	0.11403E-05	0.17111E-03	0.89086E 00	0.98000E 03	0.71252E-02	0.40000E 01

PARTICLE SIZE-MASS FREQUENCY DISTRIBUTION AT THE START OF THE CRM CALCULATIONS
(RADIUS IN METERS)

	RADIUS	MASS FRACTION
1	0.19815E-05	0.12299E-01
2	0.24965E-05	0.63204E-02
3	0.31455E-05	0.90141E-02
4	0.39630E-05	0.12490E-01
5	0.49931E-05	0.16788E-01
6	0.62909E-05	0.21873E-01
7	0.79261E-05	0.27634E-01
8	0.99862E-05	0.33886E-01
9	0.12582E-04	0.40400E-01
10	0.15852E-04	0.46916E-01
11	0.19972E-04	0.53141E-01
12	0.25164E-04	0.58716E-01
13	0.31704E-04	0.63148E-01
14	0.39945E-04	0.65718E-01
15	0.50327E-04	0.65961E-01
16	0.63408E-04	0.65662E-01
17	0.79890E-04	0.63001E-01
18	0.10065E-03	0.58511E-01
19	0.12682E-03	0.52901E-01
20	0.15978E-03	0.46659E-01
21	0.20131E-03	0.40138E-01
22	0.25363E-03	0.33629E-01
23	0.31956E-03	0.27392E-01
24	0.40262E-03	0.21656E-01
25	0.50727E-03	0.16600E-01
26	0.63912E-03	0.12335E-01
27	0.80524E-03	0.88917E-02
28	0.10145E-02	0.62277E-02
29	0.12782E-02	0.42478E-02
30	0.16105E-02	0.28297E-02
31	0.20291E-02	0.18468E-02
32	0.25565E-02	0.11848E-02
33	0.32209E-02	0.74970E-03
34	0.40581E-02	0.46933E-03
35	0.51129E-02	0.29156E-03
36	0.64419E-02	0.18021E-03
37	0.81163E-02	0.11108E-03
38	0.10226E-01	0.68426E-04
39	0.12884E-01	0.42193E-04
40	0.16233E-01	0.69849E-04

FRACTION OF THE DETONATION ENERGY YIELD IN THE CLOUD AT THE INITIAL TIME IS 0.49337E 00

CLOUD RISE IS TERMINATED IN CXPN AT STATEMENT 243 BY THE R RATE SWITCH

CLOUD RISE AND EXPANSION HISTORY TABLE CX

PARAMETERS FOR THE LOGNORMAL PARTICLE DIAMETER-MASS FREQUENCY DISTRIBUTION-

GEOMETRIC MEAN = 1.0C2E C2 MICRONS, GEOMETRIC STANDARD DEVIATION = 4.00CE 00

CLOUD HISTORY TABLE

	CLOUD TIME (SEC)	CLOUD INTERVAL (SEC)	CLOUD BASE (M)	CLOUD TOP (M)	CLOUD RADIUS (M)	BASE RATE (M/SEC)	TOP RATE (M/SEC)	RADIAL RATE (M/SEC)	TEMPERATURE (K)	GAS DENSITY (KG/M**3)
1)	2.379E 00	1.875E-01	9.412E 02	1.191E 03	1.247E 02	1.259E 00	1.259E 00	C.000E-39	2.509E 03	1.236E-01
2)	2.567E 0C	4.375E-01	9.415E 02	1.191E 03	1.247E 02	5.426E 00	5.426E 00	0.000E-39	2.502E 03	1.236E-01
3)	3.004E 00	8.750E-01	9.428E 02	1.193E 03	1.247E 02	1.194E 01	1.556E 01	1.811E 00	2.446E 03	1.236E-01
4)	3.679E 00	1.500E C0	9.543E 02	1.207E 03	1.263E 02	2.350E 01	2.864E 01	2.569E 00	2.195E 03	1.409E-01
5)	5.379E 0C	1.500E 00	9.89 E 02	1.250E 03	1.301E 02	3.082E 01	4.051E 01	4.844E 00	1.637E 03	1.880E-01
6)	6.879E 00	2.500E 00	1.036C 03	1.311E 03	1.374E 02	3.553E 01	4.654E 01	5.535E 00	1.268E 03	2.411E-01
7)	9.379E 00	3.00CE 00	1.125E 03	1.427E 03	1.512E 02	3.515E 01	4.655E 01	5.700E 00	9.072E 02	3.330E-01
8)	1.238E 01	3.500E 00	1.230E 03	1.567E 03	1.683E 02	2.970E 01	4.178E 01	6.039E 00	6.493E 02	4.586E-01
9)	1.588E 01	4.500E C0	1.334E 03	1.713E 03	1.894E 02	2.409E 01	3.625E 01	6.077E 00	4.991E 02	5.881E-01
10)	2.038E 01	5.500E 00	1.442E 03	1.876E 03	2.167E 02	1.977E 01	3.140E 01	5.815E 00	4.121E 02	7.011E-01
11)	2.588E 01	6.500E CC	1.551E 03	2.049E 03	2.487E 02	1.671E 01	2.751E 01	5.400E 00	3.647E 02	7.794E-01
12)	3.238E 01	1.000E C1	1.660E 03	2.227E 03	2.838E 02	1.421E 01	2.399E 01	4.888E 00	3.379E 02	8.271E-01
13)	4.238E 01	1.000E 01	1.802E 03	2.467E 03	3.327E 02	1.232E 01	2.112E 01	4.401E 00	3.182E 02	8.590E-01
14)	5.238E 01	1.000E C1	1.925E 03	2.678E 03	3.767E 02	1.107E 01	1.914E 01	4.033E 00	3.080E 02	8.700E-01
15)	6.238E 01	1.000E C1	2.036E 03	2.870E 03	4.170E 02	1.014E 0	1.764E 01	3.751E 00	3.018E 02	8.723E-01
16)	7.238E 01	1.500E C1	2.137E 03	3.046E 03	4.545E 02	9.248E 00	1.619E 01	3.470E 00	2.975E 02	8.704E-01
17)	8.738E 01	1.500E 01	2.276E 03	3.289E 03	5.066E 02	8.612E 00	1.504E C1	3.212E 00	2.929E 02	8.641E-01
18)	1.024E 02	1.500E C1	2.405E 03	3.515E 03	5.548E 02	8.163E 00	1.421E C1	3.023E 00	2.894E 02	8.560E-01
19)	1.174E 02	1.500E 01	2.527E 03	3.728E 03	6.001E 02	7.789E 00	1.354E 01	2.876E 00	2.866E 02	8.469E-01
20)	1.324E 02	2.000E 01	2.644E 03	3.931E 03	6.433E 02	7.469E 00	1.295E 01	2.740E 00	2.842E 02	8.374E-01
21)	1.524E 02	2.500E C1	2.794E 03	4.190E 03	6.981E 02	7.195E 00	1.241E 01	2.610E 00	2.815E 02	8.246E-01
22)	1.774E 02	2.000E 01	2.974E 03	4.500E 03	7.633E 02	6.860E 00	1.188E 01	2.508E 00	2.785E 02	8.086E-01
23)	1.974E 02	2.500E 01	3.111E 03	4.738E 03	8.135E 02	6.522E 00	1.136E 01	2.418E 00	2.764E 02	7.959E-01
24)	2.224E 02	3.000E 01	3.274E 03	5.022E 03	8.739E 02	6.102E 00	1.074E 01	2.322E 00	2.740E 02	7.807E-01
25)	2.524E 02	3.000E 01	3.457E 03	5.344E 03	9.436E 02	5.699E 00	1.015E 01	2.226E 00	2.715E 02	7.633E-01
26)	2.824E 02	3.000E 01	3.628E 03	5.649E 03	1.010E 03	5.107E 00	9.374E 00	2.134E 00	2.692E 02	7.471E-01
27)	3.124E 02	3.500E C1	3.781E 03	5.930E 03	1.074E 03	4.046E 00	8.048E 00	2.001E 00	2.673E 02	7.320E-01
28)	3.474E 02	3.500E 01	3.923E 03	6.212E 03	1.144E 03	2.877E 00	6.560E 00	1.842E 00	2.655E 02	7.175E-01
29)	3.824E 02	4.00CE 01	4.023E 03	6.441E 03	1.209E 03	1.387E 00	4.685E 00	1.649E 00	2.641E 02	7.061E-01
30)	4.224E 02	4.500E 01	4.079E 03	6.628E 03	1.275E 03	-3.998E-01	2.444E 00	1.422E 00	2.633E 02	6.975E-01
31)	4.674E 02	4.500E 01	4.061E 03	6.738E 03	1.339E 03	-1.209E 00	1.209E 00	1.209E 00	2.631E 02	6.941E-01
32)	5.124E 02	4.50CE 01	4.006E 03	6.793E 03	1.393E 03	-1.054E 00	1.054E 00	1.054E 00	2.635E 02	6.961E-01
33)	5.574E 02	0.000E-39	3.959E 03	6.840E 03	1.441E 03	0.000E-39	0.000E-39	0.000E-39	2.643E 02	7.017E-01

PARTICLE SIZE, LOWER SIZE INTERVAL BOUNDRY, MASS FREQUENCY, AND SURFACE-TO-VOLUME RATIO
FOR USE IN RSXP, TRANSPORT, AND ACTIVITY CALCULATIONS

	DIAMETER	BOUNDRY	MASS FRACTION	S/V
1	0.77955E 04	0.59247E 03	0.10000E 00	0.48096E-01
2	0.43673E 03	0.32193E 03	0.10000E 00	0.83220E-01
3	0.25825E 03	0.20716E 03	0.10000E 00	0.15014E 00
4	0.17168E 03	0.14228E 03	0.10000E 00	0.22461E 00
5	0.11940E 03	0.10019E 03	0.10000E 00	0.32227E 00
6	0.84075E 02	0.70551E 02	0.10000E 00	0.45646E 00
7	0.58469E 02	0.48456E 02	0.10000E 00	0.65882E 00
8	0.38870E 02	0.31181E 02	0.10000E 00	0.98746E 00
9	0.22985E 02	0.16943E 02	0.10000E 00	0.16524E 01
10	0.12875E 01	0.97842E-01	0.10000E 00	0.53879E 01

TIME OF SOIL SOLIDIFICATION = 3.8602 SEC

DEPOSIT INCREMENTS

#	ACT	TIM	RAD	PSC	FRA	INC	TBZ	BLA	MAS	ALT

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT -1000.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT -800.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT -600.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT -400.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT -200.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT -0.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 200.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 400.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 600.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 800.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 1000.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 1200.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 1400.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 1600.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 1800.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 2000.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 2200.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 2400.000 METERS

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DAVIES EQUATIONS ARE INACCURATE FOR      7796.453 MICRONS AT      2500.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR      7796.453 MICRONS AT      2800.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR      7796.453 MICRONS AT      3000.000 METERS

DAVIES EQUATIONS ARE INACCURATE FOR      7796.453 MICRONS AT      3200.000 METERS
           0.000E-39  3.480E 00  4.950E 01  7.796E 03  0.000E-39  1.000E 00  0.000E-39  0.000E-39  1.998E 01  9.651E 02
THE RADIUS OF AN NRDL CLOUD WAFER HAS BEEN FOUND TO BE LESS THAN HALF THE DIAGONAL OF A CLOUD SUBDIVISION.
THE WAFER PROPERTIES ARE -  RADIUS= 0.49456E 02  PARTICLE SIZE= 0.77965E 04  ALTITUDE= 0.96512E 03
TIME= 0.94001E 01  MASS/UNIT AREA= 0.10078E 02.  A SINGLE WAFER WILL BE INPUT TO THE TRANSPORT MODULE.

           0.000E-39  1.164E 01  3.675E 01  7.796E 03  0.000E-39  2.000E 00  0.000E-39  0.000E-39  1.828E 01  9.382E 02
THE RADIUS OF AN NRDL CLOUD WAFER HAS BEEN FOUND TO BE LESS THAN HALF THE DIAGONAL OF A CLOUD SUBDIVISION.
THE WAFER PROPERTIES ARE -  RADIUS= 0.36753E 02  PARTICLE SIZE= 0.77965E 04  ALTITUDE= 0.93818E 03
TIME= 0.11640E 02  MASS/UNIT AREA= 0.13278E 02.  A SINGLE WAFER WILL BE INPUT TO THE TRANSPORT MODULE.

           0.000E-39  5.546E 02  7.802E 01  4.367E 02  0.000E-39  3.000E 00  0.000E-39  0.000E-39  4.056E 00  1.153E 03
THE RADIUS OF AN NRDL CLOUD WAFER HAS BEEN FOUND TO BE LESS THAN HALF THE DIAGONAL OF A CLOUD SUBDIVISION.
THE WAFER PROPERTIES ARE -  RADIUS= 0.78019E 02  PARTICLE SIZE= 0.43673E 03  ALTITUDE= 0.11530E 04
TIME= 0.35463E 03  MASS/UNIT AREA= 0.40562E 01.  A SINGLE WAFER WILL BE INPUT TO THE TRANSPORT MODULE.

           0.000E-39  5.511E 02  3.252E 02  4.367E 02  0.000E-39  4.000E 00  0.000E-39  0.000E-39  2.335E-01  2.344E 03
THE RADIUS OF AN NRDL CLOUD WAFER HAS BEEN FOUND TO BE LESS THAN HALF THE DIAGONAL OF A CLOUD SUBDIVISION.
THE WAFER PROPERTIES ARE -  RADIUS= 0.32519E 03  PARTICLE SIZE= 0.43673E 03  ALTITUDE= 0.23439E 04
TIME= 0.35103E 03  MASS/UNIT AREA= 0.23348E 00.  A SINGLE WAFER WILL BE INPUT TO THE TRANSPORT MODULE.

           0.000E-39  3.479E 02  1.834E 02  2.582E 02  0.000E-39  5.000E 00  0.000E-39  0.000E-39  7.344E-01  2.565E 03
THE RADIUS OF AN NRDL CLOUD WAFER HAS BEEN FOUND TO BE LESS THAN HALF THE DIAGONAL OF A CLOUD SUBDIVISION.
THE WAFER PROPERTIES ARE -  RADIUS= 0.18336E 03  PARTICLE SIZE= 0.25825E 03  ALTITUDE= 0.25654E 04
TIME= 0.54793E 03  MASS/UNIT AREA= 0.73439E 00.  A SINGLE WAFER WILL BE INPUT TO THE TRANSPORT MODULE.

           0.000E-39  5.574E 02  1.441E 03  2.577E 02  0.000E-39  6.000E 00  0.000E-39  0.000E-39  1.190E-02  3.057E 03
           0.000E-39  5.463E 02  3.484E 02  1.717E 02  0.000E-39  7.000E 00  0.000E-39  0.000E-39  2.034E-01  3.352E 03
THE RADIUS OF AN NRDL CLOUD WAFER HAS BEEN FOUND TO BE LESS THAN HALF THE DIAGONAL OF A CLOUD SUBDIVISION.
THE WAFER PROPERTIES ARE -  RADIUS= 0.34837E 03  PARTICLE SIZE= 0.17168E 03  ALTITUDE= 0.33522E 04
TIME= 0.54626E 03  MASS/UNIT AREA= 0.20344E 00.  A SINGLE WAFER WILL BE INPUT TO THE TRANSPORT MODULE.

           0.000E-39  5.574E 02  1.441E 03  1.717E 02  0.000E-39  8.000E 00  0.000E-39  0.000E-39  1.190E-02  4.771E 03
           0.000E-39  5.374E 02  9.062E 02  1.194E 02  0.000E-39  9.000E 00  0.000E-39  0.000E-39  3.087E-02  3.808E 03
           0.000E-39  5.574E 02  1.441E 03  1.194E 02  0.000E-39  1.000E 01  0.000E-39  0.000E-39  1.190E-02  5.305E 03
           0.000E-39  5.574E 02  1.441E 03  8.407E 01  0.000E-39  1.100E 01  0.000E-39  0.000E-39  1.190E-02  4.212E 03
           0.000E-39  5.574E 02  1.441E 03  8.407E 01  0.000E-39  1.200E 01  0.000E-39  0.000E-39  1.190E-02  5.655E 03
           0.000E-39  5.574E 02  1.441E 03  5.847E 01  0.000E-39  1.300E 01  0.000E-39  0.000E-39  1.190E-02  4.420E 03
           0.000E-39  5.574E 02  1.441E 03  5.847E 01  0.000E-39  1.400E 01  0.000E-39  0.000E-39  1.190E-02  5.808E 03
           0.000E-39  5.574E 02  1.441E 03  3.887E 01  0.000E-39  1.500E 01  0.000E-39  0.000E-39  1.190E-02  4.562E 03
           0.000E-39  5.574E 02  1.441E 03  3.887E 01  0.000E-39  1.600E 01  0.000E-39  0.000E-39  1.190E-02  6.002E 03
           0.000E-39  5.574E 02  1.441E 03  2.298E 01  0.000E-39  1.700E 01  0.000E-39  0.000E-39  1.190E-02  4.637E 03
           0.000E-39  5.574E 02  1.441E 03  2.298E 01  0.000E-39  1.800E 01  0.000E-39  0.000E-39  1.190E-02  6.078E 03
           0.000E-39  5.574E 02  1.441E 03  1.288E 00  0.000E-39  1.900E 01  0.000E-39  0.000E-39  1.190E-02  4.679E 03
           0.000E-39  5.574E 02  1.441E 03  1.288E 00  0.000E-39  2.000E 01  0.000E-39  0.000E-39  1.190E-02  6.120E 03

ENTERING LINK 3
ENTERING LINK 4
```

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THE DEPARTMENT OF DEFENSE FALLOUT PREDICTION SYSTEM

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CLOUD RISE - TRANSPORT INTERFACE MODULE

PREPARED BY
TECHNICAL OPERATIONS RESEARCH,INC.
BURLINGTON, MASS.

FW	SSAM	SLDTMP	TMSD	SIGMA
C.1CCC00E	C.155130E 07	0.22C000E C4	0.386023E 01	0.138629E 01

TW	HOB	BZ	ROPART	NSP
0.20C00CE 01	C.10C000E 02	0.72C321E C3	0.260000E 04	1

PSEID
SHORT TEST SET FOR THE DELFIC MODEL 26 JUN 67 PSE

CRID
SHORT TEST SET FOR THE DELFIC MODEL 26 JUN 67 CLOUD RISE

DETID
SHORT TEST SET FOR THE DELFIC MODEL 26 JUN 67 INIT. CCND.

CONTRCL ARRAY IC(J),J=1,18
-C -C 1 -C -0 -0 -0 -C -0 -0 -0 -0 -0 -0 -C -C -0 -0

DETONATICN COORDINATES

XGZ	YGZ	TGZ
0.1000CCE 07	0.100000E 07	0.00000CE-38

WIND PODOGRAPH AT GROUND ZERO NMODO = 14

VECTOR ALTITUDE, ZV(J)	VX(J)	VY(J)
0.914400E 03	-0.632000E 00	0.632000E 00
0.121920E 04	0.387000E 00	-0.224000E 00
0.152400E 04	0.342000E 00	-0.287000E 00
0.182880E 04	0.447000E 00	-0.774000E 00
0.213360E 04	0.880000E 00	-0.155000E 00
0.243840E 04	0.294000E 01	0.107000E 01
0.274320E 04	0.542000E 01	0.312900E 01
0.304800E 04	0.696800E 01	0.402300E 01
0.365760E 04	0.348400E 01	0.201100E 01
0.426720E 04	0.348400E 01	0.201100E 01
0.487680E 04	0.348400E 01	0.201100E 01
0.548640E 04	0.704300E 01	-0.124200E 01
0.609600E 04	0.127660E 02	-0.225100E 01
0.990000E 05	0.127660E 02	-0.225100E 01

NPS = 10

PARTICLE SIZE	MASS FRACTION	PACT	S-V RATIO
0.779645E 04	0.100000E 00	0.592472E 03	0.480962E-01
0.436731E 03	0.100000E 00	0.321930E 03	0.832197E-01
0.258246E 03	0.100000E 00	0.207160E 03	0.150143E 00
0.171683E 03	0.100000E 00	0.142281E 03	0.224611E 00
0.119395E 03	0.100000E 00	0.100191E 03	0.322272E 00
0.840749E 02	0.100000E 00	0.705514E 02	0.456462E 00
0.584691E 02	0.100000E 00	0.484560E 02	0.658823E 00
0.388705E 02	0.100000E 00	0.311812E 02	0.987465E 00
0.229847E 02	0.100000E 00	0.169428E 02	0.165239E 01
0.128753E 01	0.100000E 00	0.978423E-01	0.538792E 01

VISCOSITY	RHO
0.182060E-04	0.134700E 01
0.181440E-04	0.132190E 01
0.180820E-04	0.129720E 01
0.180190E-04	0.127280E 01
0.179570E-04	0.124870E 01
0.185140E-04	0.115920E 01
0.184430E-04	0.114060E 01
0.183720E-04	0.112200E 01
0.183010E-04	0.110340E 01
0.182300E-04	0.108470E 01
0.186240E-04	0.102790E 01
0.184520E-04	0.102160E 01
0.183730E-04	0.100640E 01
0.182830E-04	0.990050E 00
0.181800E-04	0.972500E 00
0.180900E-04	0.956390E 00
0.180000E-04	0.940290E 00
0.179050E-04	0.923730E 00
0.178370E-04	0.915090E 00
0.177140E-04	0.894030E 00
0.176180E-04	0.878410E 00
0.175270E-04	0.863720E 00
0.174260E-04	0.848150E 00
0.173290E-04	0.833520E 00
0.172560E-04	0.820460E 00
0.171690E-04	0.802100E 00
0.170940E-04	0.788040E 00
0.170080E-04	0.773880E 00
0.169250E-04	0.759550E 00
0.168910E-04	0.744620E 00
0.168200E-04	0.726670E 00
0.167660E-04	0.711510E 00
0.167230E-04	0.694770E 00
0.166820E-04	0.678820E 00
0.166410E-04	0.663920E 00
0.165580E-04	0.650620E 00
0.164710E-04	0.637320E 00
0.163800E-04	0.624920E 00
0.162900E-04	0.612530E 00
0.162000E-04	0.600130E 00
0.161090E-04	0.587730E 00
0.160390E-04	0.576130E 00
0.159690E-04	0.564570E 00
0.159000E-04	0.553010E 00
0.158200E-04	0.541880E 00
0.157390E-04	0.530790E 00
0.156580E-04	0.519700E 00
0.155770E-04	0.508610E 00
0.154960E-04	0.497520E 00
0.154150E-04	0.486430E 00
0.153340E-04	0.475390E 00
0.152550E-04	0.464550E 00
0.151800E-04	0.454480E 00
0.151070E-04	0.444420E 00
0.150290E-04	0.434360E 00
0.149540E-04	0.424300E 00
0.148790E-04	0.414240E 00

0.148040E-04	0.404180E 00
0.147290E-04	0.394120E 00
0.146580E-04	0.384430E 00
0.145890E-04	0.374940E 00
0.145200E-04	0.365450E 00
0.144610E-04	0.356350E 00
0.144140E-04	0.347730E 00
0.143680E-04	0.339110E 00
0.143220E-04	0.330480E 00
0.142750E-04	0.321860E 00
0.142290E-04	0.313240E 00
0.141830E-04	0.304620E 00
0.141360E-04	0.296000E 00
0.140900E-04	0.287380E 00
0.140440E-04	0.278750E 00
0.140600E-04	0.269560E 00
0.140870E-04	0.260270E 00
0.140910E-04	0.252040E 00
0.140630E-04	0.245280E 00
0.140350E-04	0.238520E 00
0.140060E-04	0.231760E 00
0.139780E-04	0.225000E 00
0.139500E-04	0.218250E 00
0.139210E-04	0.211490E 00
0.138930E-04	0.204730E 00
0.139050E-04	0.198460E 00
0.139260E-04	0.192300E 00
0.139480E-04	0.186150E 00
0.139700E-04	0.180000E 00
0.139920E-04	0.173850E 00
0.140140E-04	0.167700E 00
0.140360E-04	0.161550E 00
0.140530E-04	0.155740E 00
0.140530E-04	0.151460E 00
0.140520E-04	0.147190E 00
0.140510E-04	0.142920E 00
0.140500E-04	0.138650E 00
0.140500E-04	0.134380E 00
0.140490E-04	0.130110E 00
0.140480E-04	0.125840E 00
0.140670E-04	0.121770E 00
0.141000E-04	0.117870E 00
0.141330E-04	0.113960E 00
0.141660E-04	0.110060E 00
0.142000E-04	0.106150E 00
0.142330E-04	0.102250E 00
0.142660E-04	0.983410E-01
0.142990E-04	0.944360E-01
0.143140E-04	0.916750E-01
0.139700E-04	0.931820E-01
0.139940E-04	0.901840E-01
0.140180E-04	0.871850E-01
0.140420E-04	0.841860E-01
0.140670E-04	0.811870E-01
0.140890E-04	0.786900E-01
0.141110E-04	0.761930E-01
0.141330E-04	0.736950E-01
0.141550E-04	0.711980E-01
0.141770E-04	0.687010E-01
0.141990E-04	0.666070E-01

0.142210E-04	0.645120E-01
0.142420E-04	0.624180E-01
0.142640E-04	0.603240E-01
0.142860E-04	0.582290E-01
0.143080E-04	0.564710E-01
0.143290E-04	0.547120E-01
0.143510E-04	0.529540E-01
0.143730E-04	0.511950E-01
0.143940E-04	0.494360E-01
0.144160E-04	0.479550E-01
0.144380E-04	0.464750E-01
0.144590E-04	0.449940E-01
0.144810E-04	0.435130E-01
0.145020E-04	0.420320E-01
0.145240E-04	0.407850E-01
0.145450E-04	0.395370E-01
0.145670E-04	0.382900E-01
0.145880E-04	0.370420E-01
0.146100E-04	0.357950E-01
0.146310E-04	0.347400E-01
0.146530E-04	0.336860E-01
0.146740E-04	0.326310E-01
0.146960E-04	0.315760E-01
0.147170E-04	0.305210E-01
0.147380E-04	0.296300E-01
0.147600E-04	0.287390E-01
0.147810E-04	0.278480E-01
0.148020E-04	0.269560E-01
0.148240E-04	0.260650E-01
0.148450E-04	0.253110E-01
0.148660E-04	0.245560E-01
0.148870E-04	0.238020E-01
0.149090E-04	0.230480E-01
0.149300E-04	0.222930E-01
0.149510E-04	0.216530E-01
0.149720E-04	0.210120E-01
0.149930E-04	0.203710E-01
0.150150E-04	0.197310E-01
0.150360E-04	0.190900E-01
0.150570E-04	0.185460E-01
0.150780E-04	0.180020E-01
0.150990E-04	0.174590E-01
0.151200E-04	0.169150E-01
0.151410E-04	0.163710E-01
0.151620E-04	0.159080E-01
0.151830E-04	0.154460E-01
0.152040E-04	0.149830E-01
0.152250E-04	0.145200E-01
0.152460E-04	0.140580E-01
0.152700E-04	0.136610E-01
0.152950E-04	0.132640E-01
0.153190E-04	0.128670E-01
0.153430E-04	0.124700E-01
0.153670E-04	0.120730E-01
0.153920E-04	0.117350E-01
0.154170E-04	0.113960E-01
0.154420E-04	0.110580E-01
0.154670E-04	0.107190E-01
0.154920E-04	0.103810E-01
0.155170E-04	0.100930E-01

0.155420E-04	0.980430E-02
0.155660E-04	0.951590E-02
0.155910E-04	0.922760E-02
0.156160E-04	0.893920E-02
0.156410E-04	0.869310E-02
0.156660E-04	0.844710E-02
0.156900E-04	0.820100E-02
0.157150E-04	0.795490E-02
0.157400E-04	0.770890E-02
0.157640E-04	0.749880E-02
0.157890E-04	0.728870E-02
0.158140E-04	0.707850E-02
0.158380E-04	0.686840E-02
0.158630E-04	0.665830E-02
0.158870E-04	0.647850E-02
0.159120E-04	0.629860E-02
0.159360E-04	0.611870E-02
0.159610E-04	0.593880E-02
0.159850E-04	0.575900E-02
0.160100E-04	0.560480E-02
0.160340E-04	0.545060E-02
0.160580E-04	0.529630E-02
0.160830E-04	0.514210E-02
0.161070E-04	0.498790E-02
0.161310E-04	0.485570E-02
0.161560E-04	0.472340E-02
0.161800E-04	0.459110E-02
0.162040E-04	0.445880E-02
0.162280E-04	0.432650E-02
0.162530E-04	0.421280E-02
0.162770E-04	0.409900E-02
0.163010E-04	0.398530E-02
0.163250E-04	0.387150E-02
0.163490E-04	0.375780E-02
0.163730E-04	0.365980E-02
0.163970E-04	0.356190E-02
0.164210E-04	0.346390E-02
0.164450E-04	0.336600E-02
0.164690E-04	0.326800E-02
0.164930E-04	0.318370E-02
0.165170E-04	0.309930E-02
0.165410E-04	0.301490E-02
0.165650E-04	0.293050E-02
0.165890E-04	0.284610E-02
0.166130E-04	0.277320E-02
0.166370E-04	0.270040E-02
0.166610E-04	0.262750E-02
0.166840E-04	0.255460E-02
0.167080E-04	0.248170E-02
0.167320E-04	0.241870E-02
0.167560E-04	0.235570E-02
0.167790E-04	0.229270E-02
0.168030E-04	0.222970E-02
0.168270E-04	0.216670E-02
0.168500E-04	0.211220E-02
0.168740E-04	0.205760E-02
0.168980E-04	0.200310E-02
0.169210E-04	0.194860E-02
0.169450E-04	0.189410E-02
0.169680E-04	0.184680E-02

0.169920E-04	0.179950E-02
0.170160E-04	0.175220E-02
0.170390E-04	0.170490E-02
0.170630E-04	0.165760E-02
0.170720E-04	0.161800E-02
0.170820E-04	0.157840E-02
0.170920E-04	0.153890E-02
0.171020E-04	0.149930E-02
0.171110E-04	0.145970E-02
0.171110E-04	0.142580E-02
0.171110E-04	0.139190E-02
0.171110E-04	0.135800E-02
0.171110E-04	0.132400E-02
0.171110E-04	0.129010E-02
0.171110E-04	0.126020E-02
0.171110E-04	0.123020E-02
0.171110E-04	0.120030E-02
0.171110E-04	0.117030E-02
0.171110E-04	0.114030E-02

NPCSIT= 3?

TC(J)	ZB(J)	ZT(J)	VB(J)	VT(J)
0.237906E 01	0.941220E 03	0.1?906CE 04	0.125928E 01	0.125928E 01
0.256656E 01	0.941457E 03	0.119084E 04	0.542616E 01	0.54261?E 01
0.300406E 01	0.943830E 03	0.119321E 04	0.119387E 02	0.15561?E 02
0.387906E 01	0.954277E 03	0.120583E 04	0.235?10E 02	0.286385E 02
0.537906E 01	0.989528E 03	0.124979E 04	0.308248E 02	0.40512?E 02
0.687906E 01	0.103577E 04	0.131056E 04	0.355274E 02	0.465365E 02
0.937906E 01	0.112458E 04	0.142690E 04	0.351533E 02	0.465537E 02
0.123791E 02	0.123004E 04	0.156656E 04	0.296990E 02	0.417761E 02
0.158791E 02	0.133399E 04	0.171277E 04	0.240947E 02	0.362476E 02
0.203791E 02	0.144242E 04	0.187589E 04	0.197715E 02	0.31401?E 0?
0.258791E 02	0.155116E 04	0.204860E 04	0.167118E 02	0.27511?E 02
0.323791E 02	0.165979E 04	0.222742E 04	0.142132E 02	0.23989?E 02
0.423791E 02	0.180192E 04	0.24673?E 04	0.123?67E 02	0.211189E 02
0.523791E 02	0.192509E 04	0.267850E 04	0.110700E 02	0.19?37?E 02
0.623791E 02	0.203579E 04	0.236987E 04	0.101352E 02	0.17637?E 02
0.723791E 02	0.213714E 04	0.3?4624E 04	0.924828E 01	0.1?1875E 02
0.873791E 02	0.227586E 04	0.328905E 04	0.861168E 01	0.15036?E 02
0.102379E 03	0.240504E 04	0.351459E 04	0.816274E 01	0.142097E 02
0.117379E 03	0.252748E 04	0.372774E 04	0.778852E 01	0.135408E 02
0.132379E 03	0.264431E 04	0.393085E 04	0.746916E 01	0.129499E 02
0.152379E 03	0.279369E 04	0.418984E 04	0.719501E 01	0.124148E 02
0.177379E 03	0.297357E 04	0.450021E 04	0.686029E 01	0.118758E 02
0.197379E 03	0.311077E 04	0.473773E 04	0.652240E 01	0.11359?E 02
0.222379E 03	0.327393E 04	0.5?2171E 04	0.610160E 01	0.107457E 02
0.252379E 03	0.345688E 04	0.5344?6E 04	0.569863E 01	0.101515E 02
0.282379E 03	0.362784E 04	0.564860E 04	0.510651E 01	0.937359E 01
0.312379E 03	0.378104E 04	0.592981E 04	0.4?46?2E 01	0.804827E 01
0.347379E 03	0.392265E 04	0.6?1150E 04	0.287685E 01	0.655995E 0?
0.382379E 03	0.402334E 04	0.644110E 04	0.138670E 01	0.468476E 0?
0.422379E 03	0.407881E 04	0.662849E 04	-0.399750E 00	0.?4435?E 01
0.467379E 03	0.406082E 04	0.673845E 04	-0.120913E ?	0.12091?E 0?
0.512379E 03	0.400641E 04	0.679286E 04	-0.105366E 01	0.105366E 01
0.557379E 03	0.395899E 04	0.684028E 04	0.000000E-38	0.000000E-38

CLOUD TRAJECTORY

XC	YC	ZC	TC	VC
-0.150356E 01	0.150356E 01	0.106591E 04	0.237906E 01	0.125928E 01
-0.162206E 01	0.162206E 01	0.106615E 04	0.256656E 01	0.542616E 01
-0.157538E 01	0.162708E 01	0.106852E 04	0.300406E 01	0.137500E 02
-0.123576E 01	0.143108E 01	0.108055E 04	0.387906E 01	0.260698E 02
-0.656258E 00	0.109508E 01	0.111966E 04	0.537906E 01	0.356691E 02
-0.757585E-01	0.759?8?E 00	0.117316E 04	0.687906E 01	0.410320E 02
0.891742E 00	0.199082E 0?	0.127574E 04	0.937906E 01	0.408535E 02
0.2?2333E 01	-0.514096E 00	0.139830E 04	0.123791E 02	0.357376E 02
0.322033E 01	-0.151360E 01	0.152338E 04	0.158791E 02	0.3?1712E 02
0.475933E 01	-0.281010E 01	0.165915E 04	0.203791E 02	0.255863E 02
0.714705E 01	-0.673982E 01	0.1799?E 04	0.258791E 02	0.221116E 02
0.10?526E 02	-0.117698E 02	0.194360E 04	0.323791E 02	0.191011E 02
0.180003E 02	-0.145382E 02	0.213461E 04	0.423791E 02	0.167178E 02
0.287462E 02	-0.149311E 02	0.230179E 04	0.523791E 02	0.151035E 02
0.581462E 02	-0.423?06E 01	0.245283E 04	0.623791E 02	0.138862E 02
0.877049E 02	0.660073E 01	0.259169E 04	0.723791E 02	0.127179E 02
0.169005E 03	0.535357E 02	0.278246E 04	0.873791E 02	0.118238E 02
0.256712E 03	0.105326E 03	0.295982E 04	0.102379E 03	0.1?1862E 02
0.363232E 03	0.165671E 03	0.312761E 04	0.117379E 03	0.106646E 02

0.467752E 03	0.226016E 03	0.328758E 04	0.132379E 03	0.103095E 02
0.559689E 03	0.279089E 03	0.349177E 04	0.152379E 03	0.900490E 01
0.646789E 03	0.329364E 03	0.373689E 04	0.177379E 03	0.936806E 01
0.716469E 03	0.369584E 03	0.392425E 04	0.197379E 03	0.894072E 01
0.803569E 03	0.419859E 03	0.414777E 04	0.222379E 03	0.842329E 01
0.908089E 03	0.480189E 03	0.440047E 04	0.252379E 03	0.792497E 01
0.101261E 04	0.540519E 03	0.463822E 04	0.282379E 03	0.724030E 01
0.111713E 04	0.600849E 03	0.485543E 04	0.312379E 03	0.604715E 01
0.123907E 04	0.671234E 03	0.506708E 04	0.347379E 03	0.471840E 01
0.139919E 04	0.706720E 03	0.523222E 04	0.382379E 03	0.303573E 01
0.168091E 04	0.657040E 03	0.535365E 04	0.422379E 03	0.102189E 01
0.199785E 04	0.601150E 03	0.539963E 04	0.467379E 03	-0.335276E-06
0.231478E 04	0.545260E 03	0.539963E 04	0.512379E 03	0.000000E-38
0.263172E 04	0.489370E 03	0.539963E 04	0.557379E 03	0.000000E-38

DAVIES EQUATIONS ARE INACCURATE FOR 7796.453 MICRONS AT 938.175 METERS
ENTERING LINK 5

* * * * * * * * * * *

THE DEPARTMENT OF DEFENSE FALLOUT PREDICTION SYSTEM

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TRANSPORT MODULE

PREPARED BY
TECHNICAL OPERATIONS RESEARCH, INC.
BURLINGTON, MASS.

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**** SUMMARY OF INPUT IDENTIFIERS AND INITIAL CONDITIONS ****

   ****  INITIAL CONDITIONS (FIREBALL) IDENTIFICATION  ****
SHORT TEST SET FOR THE DELFIC MODEL   26 JUN 67   INIT. COND.

   ****  CLOUD RISE IDENTIFICATION  ****
SHORT TEST SET FOR THE DELFIC MODEL   26 JUN 67   CLOUD RISE

   ****  PARTICLE SET EXPANSION IDENTIFICATION  ****
SHORT TEST SET FOR THE DELFIC MODEL   26 JUN 67   PSE

**** THIS RUN OF THE TRANSPORT MODULE WAS GIVEN THE FOLLOWING IDENTIFICATION  ****
SHORT TEST SET FOR THE DELFIC MODEL   26 JUN 67   TRANSPORT

   ****  OTHER INPUT DATA  ****

THE CONTROL VARIABLE ARRAY, IC(J), HAS BEEN GIVEN THE FOLLOWING VALUES.
 1 1 1 0  0  0  1  1  -0  -0  -0  -0 -0  -0  -0  -0 -0  -0

            THE TRANSPORT TIME LIMIT IS   28800.000

  PARTICLE DATA
    DENSITY OF FALLOUT PARTICLES       2600.000  KG/M**3
    IPARIN  1   0.10000E  07   0.10000E  07   0.00000E-38   0.72032E 03   0

  TOPOGRAPHIC DATA
    IN THIS RUN WE ASSUME A PLANAR DEPOSITION SURFACE AT ELEVATION   938.174

  WIND DATA
    TEST SET WINDFIELD
```

ATMOSPHERIC PROPERTIES FOR FALL RATE CALCULATION

HEIGHT OF BOTTOM OF STRATUM METERS ABOVE MSL	VISCOSITY (MKS)	DENSITY (MKS)
-0.11000E 04	0.18206E-04	0.13470E 01
-0.90000E 03	0.18144E-04	0.13219E 01
-0.70000E 03	0.18082E-04	0.12972E 01
-0.50000E 03	0.18019E-04	0.12728E 01
-0.30000E 03	0.17957E-04	0.12487E 01
-0.10000E 03	0.18514E-04	0.11592E 01
0.10000E 03	0.18443E-04	0.11406E 01
0.30000E 03	0.18372E-04	0.11220E 01
0.50000E 03	0.18301E-04	0.11034E 01
0.70000E 03	0.18230E-04	0.10847E 01
0.90000E 03	0.18624E-04	0.10279E 01
0.11000E 04	0.18452E-04	0.10216E 01
0.13000E 04	0.18373E-04	0.10064E 01
0.15000E 04	0.18283E-04	0.99005E 00
0.17000E 04	0.18180E-04	0.97250E 00
0.19000E 04	0.18090E-04	0.95639E 00
0.21000E 04	0.18000E-04	0.94029E 00
0.23000E 04	0.17905E-04	0.92373E 00
0.25000E 04	0.17837E-04	0.91509E 00
0.27000E 04	0.17714E-04	0.89403E 00
0.29000E 04	0.17618E-04	0.87841E 00
0.31000E 04	0.17527E-04	0.86372E 00
0.33000E 04	0.17426E-04	0.84815E 00
0.35000E 04	0.17329E-04	0.83352E 00
0.37000E 04	0.17256E-04	0.82048E 00
0.39000E 04	0.17169E-04	0.802[illegible]0E 00
0.41000E 04	0.17034E-04	0.7[illegible]804E 00
0.43000E 04	0.17008E-04	0.77383E 00
0.45000E 04	0.16925E-04	0.75955E 00
0.47000E 04	0.16891E-04	0.74462E 00
0.49000E 04	0.16820E-04	0.72667E 00
0.51000E 04	0.16766E-04	0.71151E 00
0.53000E 04	0.16723E-04	0.69477E 00
0.55000E 04	0.16682E-04	0.67882E 00
0.57000E 04	0.16641E-04	0.66392E 00
0.59000E 04	0.16558E-04	0.65062E 00
0.61000E 04	0.16471E-04	0.63732E 00
0.63000E 04	0.16380E-04	0.62492E 00
0.65000E 04	0.16290E-04	0.61253E 00
0.67000E 04	0.16200E-04	0.60013E 00
0.69000E 04	0.16109E-04	0.58773E 00
0.71000E 04	0.16039E-04	0.57613E 00
0.73000E 04	0.15969E-04	0.56457E 00
0.75000E 04	0.15900E-04	0.55301E 00
0.77000E 04	0.15820E-04	0.54188E 00
0.79000E 04	0.15739E-04	0.53079E 00
0.81000E 04	0.15658E-04	0.51970E 00
0.83000E 04	0.15577E-04	0.50861E 00
0.85000E 04	0.15496E-04	0.49752E 00
0.87000E 04	0.15418E-04	0.48643E 00
0.89000E 04	0.15334E-04	0.47535E 00
0.91000E 04	0.15255E-04	0.46453E 00
0.93000E 04	0.15180E-04	0.45446E 00
0.95000E 04	0.15105E-04	0.44442E 00

0.97000E 04	0.15029E-04	0.43436E 00
0.99000E 04	0.14954E-04	0.42430E 00
0.10100E 05	0.14879E-04	0.41424E 00
0.10300E 05	0.14804E-04	0.40418E 00
0.10500E 05	0.14729E-04	0.39412E 00
0.10700E 05	0.14658E-04	0.38443E 00
0.10900E 05	0.14589E-04	0.37494E 00
0.11100E 05	0.14520E-04	0.36545E 00
0.11300E 05	0.14461E-04	0.35635E 00
0.11500E 05	0.14414E-04	0.34773E 00
0.11700E 05	0.14368E-04	0.33911E 00
0.11900E 05	0.14322E-04	0.33048E 00
0.12100E 05	0.14275E-04	0.32186E 00
0.12300E 05	0.14229E-04	0.31324E 00
0.12500E 05	0.14183E-04	0.30462E 00
0.12700E 05	0.14136E-04	0.29600E 00
0.12900E 05	0.14090E-04	0.28738E 00
0.13100E 05	0.14044E-04	0.27875E 00
0.13300E 05	0.14060E-04	0.26956E 00
0.13500E 05	0.14087E-04	0.26027E 00
0.13700E 05	0.14091E-04	0.25204E 00
0.13900E 05	0.14063E-04	0.24528E 00
0.14100E 05	0.14035E-04	0.23852E 00
0.14300E 05	0.14006E-04	0.23176E 00
0.14500E 05	0.13978E-04	0.22500E 00
0.14700E 05	0.13950E-04	0.21825E 00
0.14900E 05	0.13921E-04	0.21149E 00
0.15100E 05	0.13893E-04	0.20473E 00
0.15300E 05	0.13905E-04	0.19846E 00
0.15500E 05	0.13926E-04	0.19230E 00
0.15700E 05	0.13948E-04	0.18615E 00
0.15900E 05	0.13970E-04	0.18000E 00
0.16100E 05	0.13992E-04	0.17385E 00
0.16300E 05	0.14014E-04	0.16770E 00
0.16500E 05	0.14036E-04	0.16155E 00
0.16700E 05	0.14053E-04	0.15574E 00
0.16900E 05	0.14053E-04	0.15146E 00
0.17100E 05	0.14052E-04	0.14719E 00
0.17300E 05	0.14051E-04	0.14292E 00
0.17500E 05	0.14050E-04	0.13865E 00
0.17700E 05	0.14050E-04	0.13438E 00
0.17900E 05	0.14049E-04	0.13011E 00
0.18100E 05	0.14048E-04	0.12584E 00
0.18300E 05	0.14067E-04	0.12177E 00
0.18500E 05	0.14100E-04	0.11787E 00
0.18700E 05	0.14133E-04	0.11396E 00
0.18900E 05	0.14166E-04	0.11006E 00
0.19100E 05	0.14200E-04	0.10615E 00
0.19300E 05	0.14233E-04	0.10225E 00
0.19500E 05	0.14266E-04	0.98341E-01
0.19700E 05	0.14299E-04	0.94436E-01
0.19900E 05	0.14314E-04	0.91675E-01
0.20100E 05	0.13970E-04	0.93182E-01
0.20300E 05	0.13994E-04	0.90184E-01
0.20500E 05	0.14018E-04	0.87185E-01
0.20700E 05	0.14042E-04	0.84186E-01
0.20900E 05	0.14067E-04	0.81187E-01
0.21100E 05	0.14089E-04	0.78690E-01
0.21300E 05	0.14111E-04	0.76193E-01
0.21500E 05	0.14133E-04	0.73695E-01

0.21700E 05	0.14155E-04	0.71198E-01
0.21900E 05	0.14177E-04	0.68701E-01
0.22100E 05	0.14199E-04	0.66607E-01
0.22300E 05	0.14221E-04	0.64512E-01
0.22500E 05	0.14242E-04	0.62418E-01
0.22700E 05	0.14264E-04	0.60324E-01
0.22900E 05	0.14286E-04	0.58229E-01
0.23100E 05	0.14308E-04	0.56471E-01
0.23300E 05	0.14329E-04	0.54712E-01
0.23500E 05	0.14351E-04	0.52954E-01
0.23700E 05	0.14373E-04	0.51195E-01
0.23900E 05	0.14394E-04	0.49436E-01
0.24100E 05	0.14416E-04	0.47955E-01
0.24300E 05	0.14438E-04	0.46475E-01
0.24500E 05	0.14459E-04	0.44994E-01
0.24700E 05	0.14481E-04	0.43513E-01
0.24900E 05	0.14502E-04	0.42032E-01
0.25100E 05	0.14524E-04	0.40785E-01
0.25300E 05	0.14545E-04	0.39537E-01
0.25500E 05	0.14567E-04	0.38290E-01
0.25700E 05	0.14588E-04	0.37042E-01
0.25900E 05	0.14610E-04	0.35795E-01
0.26100E 05	0.14631E-04	0.34740E-01
0.26300E 05	0.14653E-04	0.33686E-01
0.26500E 05	0.14674E-04	0.32631E-01
0.26700E 05	0.14696E-04	0.31576E-01
0.26900E 05	0.14717E-04	0.30521E-01
0.27100E 05	0.14738E-04	0.29630E-01
0.27300E 05	0.14760E-04	0.28739E-01
0.27500E 05	0.14781E-04	0.27848E-01
0.27700E 05	0.14802E-04	0.26956E-01
0.27900E 05	0.14824E-04	0.26065E-01
0.28100E 05	0.14845E-04	0.25311E-01
0.28300E 05	0.14866E-04	0.24556E-01
0.28500E 05	0.14887E-04	0.23802E-01
0.28700E 05	0.14909E-04	0.23048E-01
0.28900E 05	0.14930E-04	0.22293E-01
0.29100E 05	0.14951E-04	0.21653E-01
0.29300E 05	0.14972E-04	0.21012E-01
0.29500E 05	0.14993E-04	0.20371E-01
0.29700E 05	0.15015E-04	0.19731E-01
0.29900E 05	0.15036E-04	0.19090E-01
0.30100E 05	0.15057E-04	0.18546E-01
0.30300E 05	0.15078E-04	0.18002E-01
0.30500E 05	0.15099E-04	0.17459E-01
0.30700E 05	0.15120E-04	0.16915E-01
0.30900E 05	0.15141E-04	0.16371E-01
0.31100E 05	0.15162E-04	0.15908E-01
0.31300E 05	0.15183E-04	0.15446E-01
0.31500E 05	0.15204E-04	0.14983E-01
0.31700E 05	0.15225E-04	0.14520E-01
0.31900E 05	0.15246E-04	0.14058E-01
0.32100E 05	0.15270E-04	0.13661E-01
0.32300E 05	0.15295E-04	0.13264E-01
0.32500E 05	[illegible]	0.12867E-01
0.32700E 05	0.15345E-04	0.12470E-01
0.32900E 05	0.15367E-04	0.12073E-01
0.33100E 05	0.15392E-04	0.11735E-01
0.33300E 05	0.15427E-04	0.11396E-01
[illegible] 05	[illegible]	0.11058E-01

0.33700E 05	0.15467E-04	0.10719E-01
0.33900E 05	0.15492E-04	0.10381E-01
0.34100E 05	0.15517E-04	0.10093E-01
0.34300E 05	0.15542E-04	0.98043E-02
0.34500E 05	0.15566E-04	0.95159E-02
0.34700E 05	0.15591E-04	0.92276E-02
0.34900E 05	0.15616E-04	0.89392E-02
0.35100E 05	0.15641E-04	0.86931E-02
0.35300E 05	0.15666E-04	0.84471E-02
0.35500E 05	0.15690E-04	0.82010E-02
0.35700E 05	0.15715E-04	0.79549E-02
0.35900E 05	0.15740E-04	0.77089E-02
0.36100E 05	0.15764E-04	0.74988E-02
0.36300E 05	0.15789E-04	0.72887E-02
0.36500E 05	0.15814E-04	0.70785E-02
0.36700E 05	0.15838E-04	0.68684E-02
0.36900E 05	0.15863E-04	0.66583E-02
0.37100E 05	0.15887E-04	0.64785E-02
0.37300E 05	0.15912E-04	0.62986E-02
0.37500E 05	0.15936E-04	0.61187E-02
0.37700E 05	0.15961E-04	0.59388E-02
0.37900E 05	0.15985E-04	0.57590E-02
0.38100E 05	0.16010E-04	0.56048E-02
0.38300E 05	0.16034E-04	0.54506E-02
0.38500E 05	0.16058E-04	0.52963E-02
0.38700E 05	0.16083E-04	0.51421E-02
0.38900E 05	0.16107E-04	0.49879E-02
0.39100E 05	0.16131E-04	0.48557E-02
0.39300E 05	0.16156E-04	0.47234E-02
0.39500E 05	0.16180E-04	0.45911E-02
0.39700E 05	0.16204E-04	0.44588E-02
0.39900E 05	0.16228E-04	0.43265E-02
0.40100E 05	0.16253E-04	0.42128E-02
0.40300E 05	0.16277E-04	0.40990E-02
0.40500E 05	0.16301E-04	0.39853E-02
0.40700E 05	0.16325E-04	0.38715E-02
0.40900E 05	0.16349E-04	0.37578E-02
0.41100E 05	0.16373E-04	0.36598E-02
0.41300E 05	0.16397E-04	0.35619E-02
0.41500E 05	0.16421E-04	0.34639E-02
0.41700E 05	0.16445E-04	0.33660E-02
0.41900E 05	0.16469E-04	0.32680E-02
0.42100E 05	0.16493E-04	0.31837E-02
0.42300E 05	0.16517E-04	0.30993E-02
0.42500E 05	0.16541E-04	0.30149E-02
0.42700E 05	0.16565E-04	0.29305E-02
0.42900E 05	0.16589E-04	0.28461E-02
0.43100E 05	0.16613E-04	0.27732E-02
0.43300E 05	0.16637E-04	0.27004E-02
0.43500E 05	0.16661E-04	0.26275E-02
0.43700E 05	0.16684E-04	0.25546E-02
0.43900E 05	0.16708E-04	0.24817E-02
0.44100E 05	0.16732E-04	0.24187E-02
0.44300E 05	0.16756E-04	0.23557E-02
0.44500E 05	0.16779E-04	0.22927E-02
0.44700E 05	0.16803E-04	0.22297E-02
0.44900E 05	0.16827E-04	0.21667E-02
0.45100E 05	0.16850E-04	0.21122E-02
0.45300E 05	0.16874E-04	0.20576E-02
0.45500E 05	0.16898E-04	0.20031E-02

0.45700E 05	0.16921E-04	0.19486E-02
0.45900E 05	0.16945E-04	0.18941E-02
0.46100E 05	0.16968E-04	0.18468E-02
0.46300E 05	0.16992E-04	0.17995E-02
0.46500E 05	0.17016E-04	0.17522E-02
0.46700E 05	0.17039E-04	0.17049E-02
0.46900E 05	0.17063E-04	0.16576E-02
0.47100E 05	0.17072E-04	0.16180E-02
0.47300E 05	0.17082E-04	0.15784E-02
0.47500E 05	0.17092E-04	0.15389E-02
0.47700E 05	0.17102E-04	0.14993E-02
0.47900E 05	0.17111E-04	0.14597E-02
0.48100E 05	0.17111E-04	0.14258E-02
0.48300E 05	0.17111E-04	0.13919E-02
0.48500E 05	0.17111E-04	0.13580E-02
0.48700E 05	0.17111E-04	0.13240E-02
0.48900E 05	0.17111E-04	0.12901E-02
0.49100E 05	0.17111E-04	0.12602E-02
0.49300E 05	0.17111E-04	0.12302E-02
0.49500E 05	0.17111E-04	0.12003E-02
0.49700E 05	0.17111E-04	0.11703E-02
0.49900E 05	0.17111E-04	0.11403E-02

ENTERING LINK 6

UNDRFLOW AT 56423 IN MQ

UNDRFLOW AT 56424 IN MQ

UNDRFLOW AT 56423 IN MQ

UNDRFLOW AT 56424 IN MQ

UNDRFLOW AT 56423 IN MQ

THE FOLLOWING WIND VECTORS HAVE BEEN USED TO DEFINE AN ATMOSPHERE UP TO TIME 28800.

VECTOR	HORIZONTAL COORDINATES		VECTOR COMPONENTS		
HEIGHT	XS	YS	VX	VY	VZ
938.174	1000000.000	1000000.000	0.432	0.116	0.000
1219.200	1000000.000	1000000.000	0.864	0.231	0.000
1524.000	1000000.000	1000000.000	1.727	0.463	0.000
1828.800	1000000.000	1000000.000	2.591	0.694	0.000
2133.600	1000000.000	1000000.000	3.454	0.926	0.000
2438.400	1000000.000	1000000.000	2.940	1.070	0.000
2743.200	1000000.000	1000000.000	5.420	3.129	0.000
3048.000	1000000.000	1000000.000	6.968	4.023	0.000
3657.600	1000000.000	1000000.000	3.484	2.011	0.000
4267.200	1000000.000	1000000.000	3.484	2.011	0.000
4876.800	1000000.000	1000000.000	3.484	2.011	0.000
5486.400	1000000.000	1000000.000	7.043	-1.247	0.000
6096.000	1000000.000	1000000.000	12.766	-2.251	0.000
1097.280	1007845.000	1001131.000	1.680	-0.612	0.000
1219.200	1007845.000	1001131.000	2.520	-0.917	0.000
1524.000	1007845.000	1001131.000	3.360	-1.223	0.000
1828.800	1007845.000	1001131.000	3.780	-1.376	0.000
2133.600	1007845.000	1001131.000	3.360	-1.223	0.000
2438.400	1007845.000	1001131.000	2.940	1.070	0.000
2743.200	1007845.000	1001131.000	5.420	3.129	0.000

3048.000	1007845.000	1001131.000	6.968	4.023	0.000
3657.600	1007845.000	1001131.000	3.484	2.011	0.000
4267.200	1007845.000	1001131.000	3.484	2.011	0.000
4876.800	1007845.000	1001131.000	3.484	2.011	0.000
5486.400	1007845.000	1001131.000	7.043	-1.247	0.000
6096.000	1007845.000	1001131.000	12.766	-2.251	0.000
914.400	1014006.000	1004199.000	0.000	0.000	0.000
1341.120	1014006.000	1004199.000	1.149	1.370	0.000
1524.000	1014006.000	1004199.000	1.724	2.055	0.000
1828.800	1014006.000	1004199.000	2.586	3.082	0.000
2133.600	1014006.000	1004199.000	2.586	3.082	0.000
2438.400	1014006.000	1004199.000	3.585	1.826	0.000
2743.200	1014006.000	1004199.000	5.267	2.456	0.000
3048.000	1014006.000	1004199.000	6.534	2.909	0.000
3657.600	1014006.000	1004199.000	4.821	2.351	0.000
4267.200	1014006.000	1004199.000	3.871	2.235	0.000
4876.800	1014006.000	1004199.000	3.871	2.235	0.000
5486.400	1014006.000	1004199.000	7.125	-0.623	0.000
6096.000	1014006.000	1004199.000	10.889	-2.514	0.000
914.400	1017853.000	1008952.000	0.000	0.000	0.000
1219.200	1017853.000	1008952.000	0.000	0.000	0.000
1524.000	1017853.000	1008952.000	1.724	2.055	0.000
1828.800	1017853.000	1008952.000	2.586	3.082	0.000
2133.600	1017853.000	1008952.000	2.586	3.082	0.000
2438.400	1017853.000	1008952.000	3.585	1.826	0.000
2743.200	1017853.000	1008952.000	5.267	2.456	0.000
3048.000	1017853.000	1008952.000	6.534	2.909	0.000
3657.600	1017853.000	1008952.000	4.821	2.351	0.000
4267.200	1017853.000	1008952.000	3.871	2.235	0.000
4876.800	1017853.000	1008952.000	3.871	2.235	0.000
5486.400	1017853.000	1008952.000	7.125	-0.623	0.000
6096.000	1017853.000	1008952.000	10.889	-2.514	0.000
914.400	1023385.000	1013452.000	0.000	0.000	0.000
1219.200	1023385.000	1013452.000	0.000	1.788	0.000
1524.000	1023385.000	1013452.000	0.000	2.682	0.000
1828.800	1023385.000	1013452.000	0.000	4.023	0.000
2133.600	1023385.000	1013452.000	1.529	4.200	0.000
2438.400	1023385.000	1013452.023	4.076	2.750	0.000
2743.200	1023385.000	1013452.023	4.590	1.762	0.000
3048.000	1023385.000	1013452.023	5.101	1.658	0.000
3352.800	1023385.000	1013452.023	5.461	1.987	0.000
3657.600	1023385.000	1013452.023	5.842	2.243	0.000
3962.400	1023385.000	1013452.023	4.938	2.096	0.000
4267.200	1023385.000	1013452.023	4.258	2.458	0.000
4572.000	1023385.000	1013452.023	3.978	2.890	0.000
4876.800	1023385.000	1013452.023	4.258	2.458	0.000
5181.600	1023385.000	1013452.023	5.181	1.388	0.000
5486.400	1023385.000	1013452.023	6.704	0.117	0.000
5791.200	1023385.000	1013452.023	7.924	-1.397	0.000
6096.000	1023385.000	1013452.023	8.977	-2.745	0.000
914.400	1026389.000	1019976.125	0.000	0.000	0.000
1219.200	1026389.000	1019976.125	1.788	-0.031	0.000
1524.000	1026389.000	1019976.125	2.249	1.461	0.000
1828.800	1026389.000	1019976.125	3.255	2.365	0.000
2133.600	1026389.000	1019976.125	3.424	2.873	0.000
2438.400	1026389.000	1019976.125	4.076	2.750	0.000
2743.200	1026389.000	1019976.125	4.590	1.762	0.000
3048.000	1026389.000	1019976.125	5.101	1.658	0.000
3352.800	1026389.000	1019976.125	5.461	1.987	0.000
3657.600	1026389.000	1019976.125	5.842	2.243	0.000

3962.400	1026389.000	1019976.125	4.938	2.096	0.000
4267.200	1026389.000	1019976.125	4.258	2.458	0.000
4572.000	1026389.000	1019976.125	3.978	2.890	0.000
4876.800	1026389.000	1019976.125	4.258	2.458	0.000
5181.600	1026389.000	1019976.125	5.181	1.388	0.000
5486.400	1026389.000	1019976.125	6.704	0.117	0.000
5791.200	1026389.000	1019976.125	7.924	-1.397	0.000
6096.000	1026389.000	1019976.125	8.977	-2.745	0.000
914.400	1005909.000	1010410.000	0.000	0.000	0.000
1219.200	1005909.000	1010410.000	0.000	0.000	0.000
1524.000	1005909.000	1010410.000	0.000	0.000	0.000
1828.800	1005909.000	1010410.000	0.000	0.000	0.000
2133.600	1005909.000	1010410.000	0.000	0.000	0.000
2438.400	1005909.000	1010410.000	2.940	1.070	0.000
2743.200	1005909.000	1010410.000	5.420	3.129	0.000
3048.000	1005909.000	1010410.000	6.968	4.023	0.000
3657.600	1005909.000	1010410.000	3.484	2.011	0.000
4267.200	1005909.000	1010410.000	3.484	2.011	0.000
4876.800	1005909.000	1010410.000	3.484	2.011	0.000
5486.400	1005909.000	1010410.000	7.043	-1.247	0.000
6096.000	1005909.000	1010410.000	12.766	-2.251	0.000
914.400	1000000.000	1019350.000	0.000	0.000	0.000
1219.200	1000000.000	1019350.000	0.000	0.000	0.000
1524.000	1000000.000	1019350.000	0.000	0.000	0.000
1828.800	1000000.000	1019350.000	0.000	0.000	0.000
2133.600	1000000.000	1019350.000	0.000	0.000	0.000
2438.400	1000000.000	1019350.000	2.940	1.070	0.000
2743.200	1000000.000	1019350.000	5.420	3.129	0.000
3048.000	1000000.000	1019350.000	6.968	4.023	0.000
3657.600	1000000.000	1019350.000	3.484	2.011	0.000
4267.200	1000000.000	1019350.000	3.484	2.011	0.000
4876.800	1000000.000	1019350.000	3.484	2.011	0.000
5486.400	1000000.000	1019350.000	7.043	-1.247	0.000
6096.000	1000000.000	1019350.000	12.766	-2.251	0.000
914.400	1013050.000	1019350.000	0.000	0.000	0.000
1219.200	1013050.000	1019350.000	0.000	0.000	0.000
1524.000	1013050.000	1019350.000	0.000	0.000	0.000
1828.800	1013050.000	1019350.000	0.000	0.000	0.000
2133.600	1013050.000	1019350.000	0.000	0.000	0.000
2438.400	1013050.000	1019350.000	4.076	2.750	0.000
2743.200	1013050.000	1019350.023	4.590	1.762	0.000
3048.000	1013050.000	1019350.023	5.101	1.658	0.000
3352.800	1013050.000	1019350.023	5.461	1.987	0.000
3657.600	1013050.000	1019350.023	5.842	2.243	0.000
3962.400	1013050.000	1019350.023	4.938	2.096	0.000
4267.200	1013050.000	1019350.023	4.258	2.458	0.000
4572.000	1013050.000	1019350.023	3.978	2.890	0.000
4876.800	1013050.000	1019350.023	4.258	2.458	0.000
5181.600	1013050.000	1019350.023	5.181	1.388	0.000
5486.400	1013050.000	1019350.023	6.704	0.117	0.000
5791.200	1023385.000	1013452.023	7.924	-1.397	0.000
6096.000	1013050.000	1019350.023	8.977	-2.745	0.000
914.400	1026550.000	1000450.000	0.000	0.000	0.000
1219.200	1026550.000	1000450.000	0.000	0.000	0.000
1524.000	[illegible]	1000450.000	0.000	0.000	0.000
1828.800	1026550.000	1000450.000	0.000	0.000	0.000
2133.600	1026550.000	1000450.000	0.000	0.000	0.000
2438.400	1026550.000	1000450.000	[illegible]	[illegible]	0.000
2743.200	1026550.000	1000450.000	5.287	[illegible]	0.000
3048.000	1026550.000	1000450.000	6.534	2.909	0.000

3657.600	1026550.000	1000450.000	4.821	2.351	0.000
4267.200	1026550.000	1000450.000	3.871	2.235	0.000
4876.800	1026550.000	1000450.000	3.871	2.235	0.000
5486.400	1026550.000	1000450.000	7.125	-0.623	0.000
6096.000	1026550.000	1000450.000	10.889	-2.514	0.000

REQUESTED GRID ARRANGEMENT

HEIGHT	INTERVAL	LIMITS			
		WLLX	WLLY	WURX	WURY
838.200	4500.000	997750.000	997750.000	1029200.000	1024700.000
990.600	4500.000	997750.000	997750.000	1029200.000	1024700.000
1143.000	4500.000	997750.000	997750.000	1029200.000	1024700.000
1295.400	4500.000	997750.000	997750.000	1029200.000	1024700.000
1447.800	4500.000	997750.000	997750.000	1029200.000	1024700.000
1600.200	4500.000	997750.000	997750.000	1029200.000	1024700.000
1752.600	4500.000	997750.000	997750.000	1029200.000	1024700.000
1905.000	4500.000	997750.000	997750.000	1029200.000	1024700.000
2057.400	4500.000	997750.000	997750.000	1029200.000	1024700.000
2209.800	4500.000	997750.000	997750.000	1029200.000	1024700.000
2362.200	4500.000	997750.000	997750.000	1029200.000	1024700.000
2514.600	4500.000	997750.000	997750.000	1029200.000	1024700.000
2667.000	4500.000	997750.000	997750.000	1029200.000	1024700.000
2819.400	4500.000	997750.000	997750.000	1029200.000	1024700.000
2971.800	4500.000	997750.000	997750.000	1029200.000	1024700.000
3124.200	4500.000	997750.000	997750.000	1029200.000	1024700.000
3276.600	4500.000	997750.000	997750.000	1029200.000	1024700.000
3429.000	4500.000	997750.000	997750.000	1029200.000	1024700.000
3581.400	4500.000	997750.000	997750.000	1029200.000	1024700.000
3733.800	4500.000	997750.000	997750.000	1029200.000	1024700.000
3886.200	4500.000	997750.000	997750.000	1029200.000	1024700.000
4038.600	4500.000	997750.000	997750.000	1029200.000	1024700.000
4191.000	4500.000	997750.000	997750.000	1029200.000	1024700.000
4343.400	4500.000	997750.000	997750.000	1029200.000	1024700.000
4495.800	4500.000	997750.000	997750.000	1029200.000	1024700.000
4648.200	4500.000	997750.000	997750.000	1029200.000	1024700.000
4800.600	4500.000	997750.000	997750.000	1029200.000	1024700.000
4953.000	4500.000	997750.000	997750.000	1029200.000	1024700.000
5105.400	4500.000	997750.000	997750.000	1029200.000	1024700.000
5257.800	4500.000	997750.000	997750.000	1029200.000	1024700.000
5410.200	4500.000	997750.000	997750.000	1029200.000	1024700.000
5562.600	4500.000	997750.000	997750.000	1029200.000	1024700.000
5715.000	4500.000	997750.000	997750.000	1029200.000	1024700.000
5867.400	4500.000	997750.000	997750.000	1029200.000	1024700.000
6019.800	4500.000	997750.000	997750.000	1029200.000	1024700.000

COMPUTATION METHOD 1 WAS USED ON THE 4 NEAREST DATA POINTS.

ALPHA = 457.200METERS, BETA = 6115.000METERS.

WIND COMPONENTS

LEVEL 1 BASE AT 838.200 METERS

EAST-WEST ROW	1					
0.55218	1.36790	1.97159	0.35262	0.07407	0.00000	0.00000
0.14795	-0.34947	-0.71760	-0.03003	0.08827	-0.00000	-0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
0.55218	1.90946	1.44665	0.07407	0.03714	0.00000	0.00000
0.14795	-0.69499	-0.49466	0.08827	0.04426	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
0.00000	0.00000	0.00000	0.02620	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.03122	0.00000	0.25801	0.49667
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.15178	0.49667	0.49667
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
0.00000	0.00000	0.00000	0.00000	0.00000	0.27121	0.46662
0.00000	0.00000	0.00000	0.00000	0.00000	0.22076	0.02196
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
0.00000	0.00000	0.00000	0.00000	0.00000	0.49667	0.49667
0.00000	0.00000	0.00000	0.00000	0.00000	-0.00861	-0.00861
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 2 BASE AT 990.600 METERS

EAST-WEST ROW	1					
0.64069	1.55389	2.05538	0.73453	0.42567	0.00000	0.00000
0.17167	-0.42205	-0.74810	0.26937	0.50729	-0.00000	-0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
0.64069	2.00863	1.69748	0.42567	0.21647	0.00000	0.00000
0.17167	-0.73108	-0.47240	0.50729	0.25797	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
0.00000	0.00000	0.00000	0.15334	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.18275	0.00000	0.46442	0.89400
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.27321	0.89400	0.89400
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
0.00000	0.00000	0.00000	0.00000	0.00000	0.48818	0.83991
0.00000	0.00000	0.00000	0.00000	0.00000	0.39736	0.03952
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
0.00000	0.00000	0.00000	0.00000	0.00000	0.89400	0.89400
0.00000	0.00000	0.00000	0.00000	0.00000	-0.01550	-0.01550
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 3 BASE AT 1143.000 METERS

EAST-WEST ROW	1					
0.93824	2.03160	2.34021	1.15285	[illegible].01425	0.00000	0.00000

0.25140	-0.62540	-0.85177	1.01306	1.20872	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
0.98824	2.31344	2.18238	1.01425	0.69044	0.00000	0.00000
0.25140	-0.84203	-0.55736	1.20872	0.82282	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
0.00000	0.00000	0.00000	0.57454	0.37477	0.00000	0.00000
0.00000	0.00000	0.00000	0.68471	0.44663	1.04651	1.59365
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
0.00000	0.00000	0.00000	0.00000	0.30012	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.71384	1.59365	1.59365
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
0.00000	0.00000	0.00000	0.00000	0.00000	1.02017	1.44686
0.00000	0.00000	0.00000	0.00000	0.00000	0.77572	0.35234
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
0.00000	0.00000	0.00000	0.00000	0.00000	1.49952	1.49952
0.00000	0.00000	0.00000	0.00000	0.00000	0.30009	0.30009
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 4 BASE AT 1295.400 METERS

EAST-WEST ROW	1					
1.26745	2.32668	2.65390	1.60397	1.40597	0.00000	0.00000
0.33961	-0.54152	-0.96595	1.32122	1.67556	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
1.26745	2.62745	2.41378	1.40597	1.18471	0.00000	0.00000
0.33961	-0.95632	-0.59320	1.67556	1.41187	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
0.00000	0.00000	0.00000	1.10271	0.86198	0.41420	0.00000
0.00000	0.00000	0.00000	1.31414	1.02726	1.65446	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
0.00000	0.00000	0.00000	0.00000	0.59855	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	1.39635	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
0.00000	0.00000	0.00000	0.00000	0.00000	1.10222	1.89638
0.00000	0.00000	0.00000	0.00000	0.00000	1.40499	0.80696
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
0.00000	0.00000	0.00000	0.00000	0.00000	2.01850	2.01850
0.00000	0.00000	0.00000	0.00000	0.00000	0.71500	0.71500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 5 BASE AT 1447.800 METERS

EAST-WEST ROW	1					
1.72708	2.88099	3.20947	1.80610	1.68384	0.00000	0.00000
0.46277	-0.77394	-1.16816	1.77119	2.00671	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
1.72708	3.20947	2.98602	1.68384	1.69459	0.00000	0.00000
0.46277	-1.16816	-0.59560	2.00671	2.01947	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 3

0.00000	0.00000	0.00000	1.35646	1.53657	0.59188	0.00000
0.00000	0.00000	0.00000	1.61655	1.83120	2.53038	2.77917
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 4

0.00000	0.00000	0.00000	0.00000	1.23048	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	2.00068	2.77917	2.77917
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 5

0.00000	0.00000	0.00000	0.00000	0.00000	1.61067	2.28433
0.00000	0.00000	0.00000	0.00000	0.00000	1.76435	1.38054
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 6

0.00000	0.00000	0.00000	0.00000	0.00000	2.36748	2.36748
0.00000	0.00000	0.00000	0.00000	0.00000	1.33317	1.33317
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 6 BASE AT 1600.200 METERS

EAST-WEST ROW 1

2.15885	3.04384	3.57035	2.08495	1.99591	0.00000	0.00000
0.57846	-0.59899	-1.29950	2.14355	2.37861	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 2

2.15885	3.47969	3.16833	1.99591	2.15495	0.00000	0.00000
0.57846	-1.26651	-0.20097	2.37861	2.56815	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 3

0.00000	0.00000	0.00000	2.15495	2.15495	1.03549	0.00000
0.00000	0.00000	0.00000	2.56815	2.56815	2.97561	3.35250
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 4

0.00000	0.00000	0.00000	0.00000	1.49638	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	2.80785	3.35250	3.35250
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 5

0.00000	0.00000	0.00000	0.00000	0.00000	1.50275	2.58551
0.00000	0.00000	0.00000	0.00000	0.00000	2.56645	2.00009
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 6

0.00000	0.00000	0.00000	0.00000	0.00000	2.75200	2.75200
0.00000	0.00000	0.00000	0.00000	0.00000	1.91300	1.91300
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 7 BASE AT 1752.600 METERS

EAST-WEST ROW 1

2.59062	3.34430	3.59774	2.51700	2.39855	0.00000	0.00000
0.69416	-0.80526	-1.30947	2.49550	2.85846	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 2

2.59062	3.54553	3.41242	2.39855	2.45325	0.00000	0.00000
0.69416	-1.29047	-0.50518	2.85846	2.92603	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 3

0.00000	0.00000	0.00000	2.45217	2.39855	1.10606	0.33235
0.00000	0.00000	0.00000	2.92236	2.85846	3.53375	3.77005
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 4

0.00000	0.00000	0.00000	0.00000	1.92075	0.33235	0.33235

0.00000	0.00000	0.00000	0.00000	3.09044	3.77005	3.77005
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 5						
0.00000	0.00000	0.00000	0.00000	0.00000	2.09069	2.96512
0.00000	0.00000	0.00000	0.00000	0.00000	2.83644	2.34016
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 6						
0.00000	0.00000	0.00000	0.00000	0.00000	3.07304	3.07304
0.00000	0.00000	0.00000	0.00000	0.00000	2.27891	2.27891
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 8 BASE AT 1905.000 METERS

EAST-WEST ROW 1						
3.02239	3.36595	3.57035	2.72600	2.58594	0.00000	0.00000
0.80985	-0.51268	-1.29950	2.45844	3.08178	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 2						
3.02239	3.47969	3.29075	2.58594	2.58594	0.00000	0.00000
0.80985	-1.26650	-0.05507	3.08178	3.08178	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 3						
0.00000	0.00000	0.00000	2.58594	2.58594	1.63969	0.76441
0.00000	0.00000	0.00000	3.08178	3.08178	3.61681	4.11170
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 4						
0.00000	0.00000	0.00000	0.00000	2.02927	0.76442	0.76441
0.00000	0.00000	0.00000	0.00000	3.39653	4.11170	4.11170
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 5						
0.00000	0.00000	0.00000	0.00000	0.00000	2.17056	3.18371
0.00000	0.00000	0.00000	0.00000	0.00000	3.29660	2.70931
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 6						
0.00000	0.00000	0.00000	0.00000	0.00000	3.33950	3.33950
0.00000	0.00000	0.00000	0.00000	0.00000	2.61900	2.61900
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 9 BASE AT 2057.400 METERS

EAST-WEST ROW 1						
3.15467	3.38390	3.36027	2.85080	2.80302	0.77925	0.77925
0.90664	-0.33419	-0.75780	2.46326	2.80887	0.39704	0.39704
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 2						
3.15467	3.31150	3.21844	2.80302	2.73735	0.77925	0.77925
0.90664	-0.74681	-0.05455	2.80887	2.89144	0.39704	0.39704
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 3						
0.63913	0.63913	0.63913	2.74091	2.80302	2.03713	1.75018
0.23261	0.23261	0.23261	2.88695	2.80887	3.58398	3.84655
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 4						
0.63913	0.63913	0.63913	0.88609	2.94920	1.75021	1.75021
0.23261	0.23261	0.23261	0.59783	3.08607	3.84654	3.84654
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 5						
0.63913	0.63913	0.88609	0.88609	0.88609	2.88961	3.45876
0.23261	0.23261	0.59783	0.59783	0.59783	3.20401	2.78726
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 6

0.63913	0.63913	0.88609	0.88609	0.88609	3.52900	3.52900
0.23261	0.23261	0.59783	0.59783	0.59783	2.73583	2.73583
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 10 BASE AT 2209.800 METERS

EAST-WEST ROW 1

3.19708	3.16767	3.15016	3.09447	3.08523	1.79226	1.79226
0.99777	0.32420	-0.07653	2.09405	2.45409	0.91320	0.91320
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 2

3.19708	3.10750	3.13172	3.08523	3.08523	1.79226	1.79226
0.99777	-0.06100	0.64225	2.45409	2.45409	0.91320	0.91320
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 3

1.47000	1.47000	1.47000	3.08523	3.08523	2.93831	2.80238
0.53500	0.53500	0.53500	2.45409	2.45409	2.98454	3.47522
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 4

1.47000	1.47000	1.47000	2.03800	2.99880	2.80242	2.80242
0.53500	0.53500	0.53500	1.37500	2.76615	3.47520	3.47520
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 5

1.47000	1.47000	2.03800	2.03800	2.03800	3.31985	3.69267
0.53500	0.53500	1.37500	1.37500	1.37500	3.11278	2.85165
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 6

1.47000	1.47000	2.03800	2.03800	2.03800	3.75000	3.75000
0.53500	0.53500	1.37500	1.37500	1.3 500	2.81150	2.81150
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 11 BASE AT 2362.200 METERS

EAST-WEST ROW 1

3.59091	3.41184	3.57051	3.60512	3.73311	3.17095	3.17095
1.48620	1.03192	1.01912	2.13618	2.23614	1.56619	1.56619
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 2

3.59091	3.56136	3.57307	3.73311	3.68815	3.17095	3.17095
1.48620	1.01986	1.16698	2.23614	2.11218	1.56619	1.56619
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 3

2.84000	2.84000	2 84000	3.69060	3.73311	3.61702	3.63398
1.28500	1.28500	1.28500	2.11891	2.23614	2.49892	2.85054
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 4

2.84000	2.84000	2.84000	3.30163	3.80141	3.63401	3.63401
1.28500	1.28500	1.28500	1.93739	2.33851	2.85052	2.85052
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 5

2.84000	2.84000	3.30165	3.30165	3.30165	4.05559	4.04705
1.28500	1.28500	1.93739	1.93739	1.93739	2.62207	2.56856
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 6

2.84000	2.84000	3.30166	3.30165	3.30167	4.04600	4.04600
1.28500	1.28500	.93739	1.93739	1.93739	2.56196	2.56196
0.00000	0.00000	00000	0.00000	0.00000	0.00000	0.00000

LEVEL 12 BASE AT 2514.600 METERS

EAST-WEST ROW 1

4.18000	4.18000	4.18000	4.39961	4.42555	4.42555	4.42555
2.09950	2.09950	2.09950	2.13520	2.14112	2.14112	2.14112
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 2

4.18000	4.18000	4.24974	4.42555	4.42555	4.42555	4.42555
2.09950	2.09950	2.11132	2.14112	2.14112	2.14112	2.14112
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 3

4.18000	4.18000	4.18000	4.42555	4.42555	4.37747	4.33300
2.09950	2.09950	2.09950	2.14112	2.14112	2.20080	2.25600
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 4

4.18000	4.18000	4.18000	4.33299	4.39727	4.33300	4.33300
2.09950	2.09950	2.09950	2.25602	2.17623	2.25600	2.25600
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 5

4.18000	4.18000	4.33300	4.33300	4.33300	4.33300	4.33300
2.09950	2.09950	2.25600	2.25600	2.25600	2.25600	2.25600
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 6

4.18000	4.18000	4.33300	4.33300	4.33301	4.33300	4.33300
2.09950	2.09950	2.25600	2.25600	2.25599	2.25600	2.25600
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 13 BASE AT 2667.000 METERS

EAST-WEST ROW 1

5.21739	5.26838	5.21739	5.19726	5.17637	5.17637	5.17637
2.87574	2.93947	2.87574	2.47830	2.41752	2.41752	2.41752
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 2

5.21739	5.22073	[illegible]	5.17637	5.20366	5.17637	5.17637
2.87574	2.87541	2.79803	2.41752	2.42911	2.41752	2.41752
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 3

5.21739	5.21739	5.21739	5.20218	5.17637	4.82186	4.58935
2.87574	2.87574	2.87574	2.42848	2.41752	2.12641	1.95417
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 4

5.21739	5.21739	5.21739	4.58934	5.05957	4.58935	4.58935
2.87574	2.87574	2.87574	1.95419	2.28694	1.95417	1.95417
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 5

5.21739	5.21739	4.58935	4.58935	4.58935	4.58956	4.58937
2.87574	2.87574	1.95417	1.95417	1.95418	1.89274	1.94742
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 6

5.21739	5.21739	4.58935	4.58935	4.58935	4.58935	4.58935
2.87574	2.87574	1.95417	1.95417	1.95416	1.95417	1.95417
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 14 BASE AT 2819.400 METERS

EAST-WEST ROW 1

6.19400	6.19400	6.19400	5.94195	5.90014	5.90014	5.90014
3.57600	3.57600	3.57600	2.80955	2.68242	2.68242	2.68242
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 2

6.19400	6.19400	6.11053	5.90014	5.90014	5.90014	5.90014
3.57600	3.57600	3.32219	2.68242	2.68242	2.68242	2.68242
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
6.19400	6.19400	6.19400	5.90014	5.90014	5.35228	4.84550
3.57600	3.57600	3.57600	2.68242	2.68242	2.17727	1.71000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
6.19400	6.19400	6.19400	4.84550	5.57783	4.84550	4.84550
3.57600	3.57600	3.57600	1.71000	2.38524	1.71000	1.71000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
6.19400	6.19400	4.84550	4.84550	4.84550	4.84550	4.84550
3.57600	3.57600	1.71000	1.71000	1.71000	1.71000	1.71000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
6.19400	6.19400	4.84550	4.84550	4.84550	4.84550	4.84550
3.57600	3.57600	1.71000	1.71000	1.71000	1.71000	1.71000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
LEVEL 15	BASE AT	2971.800 METERS				
EAST-WEST ROW	1					
6.53800	6.53800	6.53800	6.23241	6.18173	6.18173	6.18173
3.77467	3.77467	3.77467	2.92419	2.78312	2.78312	2.78312
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
6.53800	6.53800	6.43681	6.18173	6.18173	6.18173	6.18173
3.77467	3.77467	3.49304	2.78312	2.78312	2.78312	2.78312
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
6.53800	6.53800	6.53800	6.18173	6.18173	5.57133	5.06817
3.77467	3.77467	3.77467	2.78312	2.78312	2.14932	1.75213
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
6.53800	6.53800	6.53800	5.06817	5.88201	5.06817	5.06817
3.77467	3.77467	3.77467	1.75213	2.46721	1.75213	1.75213
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
6.53800	6.53800	5.06817	5.06817	5.06817	5.07867	5.06933
3.77467	3.77467	1.75213	1.75213	1.75213	1.72204	1.74882
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
6.53800	6.53800	5.06817	5.06817	5.06817	5.06817	5.06817
3.77467	3.77467	1.75213	1.75213	1.75213	1.75213	1.75213
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
LEVEL 16	BASE AT	3124.200 METERS				
EAST-WEST ROW	1					
6.96800	6.96800	6.96800	6.59550	6.53371	6.53371	6.53371
4.02300	4.02300	4.02300	3.06749	2.90900	2.90900	2.90900
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
6.96800	6.96800	6.84465	6.53371	6.53371	6.53371	6.53371
4.02300	4.02300	3.70659	2.90900	2.90900	2.90900	2.90900
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
6.96800	6.96800	6.96800	6.53371	6.53371	5.67716	5.28100
4.02300	4.02300	4.02300	2.90900	2.90900	2.16610	1.82250

0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
6.96800	6.96800	6.96800	5.3[illegible]00	5.94726	5.28100	5.28100
4.02300	4.02300	4.02300	1.82250	2.40036	1.82250	1.82250
0.00000	0.00000	0.00000	0.00000	0.01000	0.00000	0.00000
EAST-WEST ROW	5					
6.96800	6.96800	5.28100	5.28100	5.28100	5.28100	5.28100
4.02300	4.02300	1.82250	1.82250	1.82250	1.82250	1.82250
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
6.96800	6.96800	5.28100	5.28100	5.28100	5.28100	5.28100
4.02300	4.02300	1.82250	1.82250	1.82250	1.82250	1.82250
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 17 BASE AT 3275.600 METERS

EAST-WEST ROW	1					
5.22600	5.22600	5.22600	5.61319	5.67741	5.67741	5.67741
3.01700	3.01700	3.01700	2.68524	2.63021	2.63021	2.63021
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
5.22600	5.22600	5.35422	5.67741	5.67741	5.67741	5.67741
3.01700	3.01700	2.90714	2.63021	2.63021	2.63021	2.63021
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
5.22600	5.22600	5.22600	5.67741	5.67741	5.64440	5.46557
3.01700	3.01700	3.01700	2.63021	2.63021	2.12815	1.97113
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
5.22600	5.22600	5.22600	5.46557	5.53799	5.46557	5.46557
3.01700	3.01700	3.01700	1.97113	2.30550	1.97113	1.97113
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
5.22600	5.22600	5.46557	5.46557	5.46557	5.46411	5.46540
3.01700	3.01700	1.97113	1.97113	1.97113	1.97620	1.97169
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
5.22600	5.22600	5.46557	5.46557	5.46557	5.46557	5.46557
3.01700	3.01700	1.97113	1.97113	1.97113	1.97113	1.97113
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 18 BASE AT 3429.000 METERS

EAST-WEST ROW	1					
3.48400	3.48400	3.48400	4.63088	4.82111	4.82111	4.82111
2.01100	2.01100	2.01100	2.30299	2.35142	2.35142	2.35142
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
3.48400	3.48400	3.06378	4.82111	4.82111	4.82111	4.82111
2.01100	2.01100	2.10769	2.35142	2.35142	2.35142	2.35[illegible]2
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
3.48400	3.48400	3.48400	4.82111	4.82111	5.38890	5.65150
2.01100	2.01100	2.01100	2.35142	2.35142	2.18977	2.11500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
3.48400	3.48400	3.48400	5.65150	5.20985	5.65150	5.65150
2.01100	2.01100	2.01100	2.11500	2.24974	2.11500	2.11500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					

	3.48400	3.48400	5.65150	5.65150	5.65150	5.65150	5.65150
	2.01100	2.01100	2.11500	2.11500	2.11500	2.11500	2.11500
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		6					
	3.48400	3.48400	5.65150	5.65150	5.65150	5.65150	5.65150
	2.01100	2.01100	2.11500	2.11500	2.11500	2.11500	2.11500
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
LEVEL 19	BASE AT		3581.400 METERS				
EAST-WEST ROW		1					
	3.48400	3.48400	3.48400	4.63087	4.82111	4.82111	4.82111
	2.01100	2.01100	2.01100	2.30299	2.35142	2.35142	2.35142
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		2					
	3.48400	3.48400	3.86378	4.82111	4.82111	4.82111	4.82111
	2.01100	2.01100	2.10769	2.35142	2.35142	2.35142	2.35142
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		3					
	3.48400	3.48400	3.48400	4.82111	4.82111	5.30806	5.56265
	2.01100	2.01100	2.01100	2.35142	2.35142	2.22269	2.15539
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		4					
	3.48400	3.48400	3.48400	5.56265	5.14574	5.56265	5.56265
	2.01100	2.01100	2.01100	2.15539	2.26560	2.15539	2.15539
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		5					
	3.48400	3.48400	5.56265	5.56265	5.56265	5.65195	5.57246
	2.01100	2.01100	2.15539	2.15539	2.15539	2.18340	2.15847
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		6					
	3.48400	3.48400	5.56265	5.56265	5.56265	5.56265	5.56265
	2.01100	2.01100	2.15539	2.15539	2.15539	2.15539	2.15539
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
LEVEL 20	BASE AT		3733.800 METERS				
EAST-WEST ROW		1					
	3.48400	3.48400	3.48400	4.63087	4.82111	4.82111	4.82111
	2.01100	2.01100	2.01100	2.30299	2.35142	2.35142	2.35142
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		2					
	3.48400	3.48400	3.86378	4.82111	4.82111	4.82111	4.82111
	2.01100	2.01100	2.10769	2.35142	2.35142	2.35142	2.35142
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		3					
	3.48400	3.48400	3.48400	4.82111	4.82111	5.21009	5.39000
	2.01100	2.01100	2.01100	2.35142	2.35142	2.22703	2.16950
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		4					
	3.48400	3.48400	3.48400	5.39000	5.08743	5.39000	5.39000
	2.01100	2.01100	2.01100	2.16950	2.26625	2.16950	2.16950
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		5					
	3.48400	3.48400	5.39000	5.39000	5.39000	5.39000	5.39000
	2.01100	2.01100	2.16950	2.16950	2.16950	2.16950	2.16950
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW		6					
	3.48400	3.48400	5.39000	5.39000	5.39000	5.39000	5.39000
	2.01100	2.01100	2.16950	2.16950	2.16950	2.16950	2.16950

0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 21 BASE AT 3886.200 METERS

EAST-WEST ROW 1						
3.48400	3.48400	3.48400	4.22347	4.34613	4.34613	4.34613
2.01100	2.01100	2.01100	2.25306	2.29321	2.29321	2.29321
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 2						
3.48400	3.48400	3.72887	4.34613	4.34613	4.34613	4.34613
2.01100	2.01100	2.09116	2.29321	2.29321	2.29321	2.29321
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 3						
3.48400	3.48400	3.48400	4.34613	4.34613	4.95897	4.98670
2.01100	2.01100	2.01100	2.29321	2.29321	2.23089	2.20665
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 4						
3.48400	3.48400	3.48400	4.98670	4.71875	4.98670	4.98670
2.01100	2.01100	2.01100	2.20665	2.22409	2.20665	2.20665
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 5						
3.48400	3.48400	4.98670	4.98670	4.98670	4.97113	4.98499
2.01100	2.01100	2.20665	2.20665	2.20665	2.17128	2.20277
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 6						
3.48400	3.48400	4.98670	4.98670	4.98670	4.98670	4.98670
2.01100	2.01100	2.20665	2.20665	2.20665	2.20665	2.20665
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 22 BASE AT 4038.600 METERS

EAST-WEST ROW 1						
3.48400	3.48400	3.48400	3.81607	3.87115	3.87115	3.87115
2.01100	2.01100	2.01100	2.20313	2.23500	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 2						
3.48400	3.48400	3.59396	3.87115	3.87115	3.87115	3.87115
2.01100	2.01100	2.07462	2.23500	2.23500	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 3						
3.48400	3.48400	3.48400	3.87115	3.87115	4.36814	4.59800
2.01100	2.01100	2.01100	2.23500	2.23500	2.26372	2.27700
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 4						
3.48400	3.48400	3.48400	4.59800	4.21142	4.59800	4.59800
2.01100	2.01100	2.01100	2.27700	2.25466	2.27700	2.27700
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 5						
3.48400	3.48400	4.59800	4.59800	4.59800	4.59800	4.59800
2.01100	2.01100	2.27700	2.27700	2.27700	2.27700	2.27700
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW 6						
3.48400	3.48400	4.59800	4.59800	4.59800	4.59800	4.59800
2.01100	2.01100	2.27700	2.27700	2.27700	2.27700	2.27700
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 23 BASE AT 4191.000 METERS

EAST-WEST ROW 1						
3.48400	3.48400	3.48400	3.81607	3.87115	3.87115	3.87115

2.01100	2.01100	2.01100	2.20313	2.23500	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
3.48400	3.48400	3.59396	3.87115	3.87115	3.87115	3.87115
2.01100	2.01100	2.07462	2.23500	2.23500	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
3.48400	3.48400	3.48400	3.87115	3.87115	4.18229	4.34496
2.01100	2.01100	2.01100	2.23500	2.23500	2.39143	2.47322
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
3.48400	3.48400	3.48400	4.34496	4.07857	4.34496	4.34496
2.01100	2.01100	2.01100	2.47322	2.33929	2.47322	2.47322
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
3.48400	3.48400	4.34496	4.34496	4.34496	4.31716	4.34190
2.01100	2.01100	2.47322	2.47322	2.47322	2.46835	2.47268
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
3.48400	3.48400	4.34496	4.34496	4.34496	4.34496	4.34496
2.01100	2.01100	2.47322	2.47322	2.47322	2.47322	2.47322
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
LEVEL 24	BASE AT	4343.400 METERS				
EAST-WEST ROW	1					
3.48400	3.48400	3.48400	3.81607	3.87115	3.87115	3.87115
2.01100	2.01100	2.01100	2.20313	2.23500	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
3.48400	3.48400	3.59396	3.87115	3.87115	3.87115	3.87115
2.01100	2.01100	2.07462	2.23500	2.23500	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
3.48400	3.48400	3.48400	3.87115	3.87115	4.03994	4.11800
2.01100	2.01100	2.01100	2.23500	2.23500	2.53517	2.67400
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
3.48400	3.48400	3.48400	4.11800	3.98671	4.11800	4.11800
2.01100	2.01100	2.01100	2.67400	2.44052	2.67400	2.67400
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
3.48400	3.48400	4.11800	4.11800	4.11800	4.11800	4.11800
2.01100	2.01100	2.67400	2.67400	2.67400	2.67400	2.67400
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
3.48400	3.48400	4.11800	4.11800	4.11800	4.11800	4.11800
2.01100	2.01100	2.67400	2.67400	2.67400	2.67400	2.67400
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
LEVEL 25	BASE AT	4495.800 METERS				
EAST-WEST ROW	1					
3.48400	3.48400	3.48400	3.81607	3.87115	3.87115	3.87115
2.01100	2.01100	2.01100	2.20313	2.23500	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
3.48400	3.48400	3.59396	3.87115	3.87115	3.87115	3.87115
2.01100	2.01100	2.07462	2.23500	2.23500	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

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EAST-WEST ROW     3
    3.48400     3.48400     3.48400     3.87115     3.87115     4.06147     4.09974
    2.01100     2.01100     2.01100     2.23500     2.23500     2.62396     2.70217
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     4
    3.48400     3.48400     3.48400     4.09974     3.95276     4.09974     4.09974
    2.01100     2.01100     2.01100     2.70217     2.47148     2.70217     2.70217
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     5
    3.48400     3.48400     4.09974     4.09974     4.09974     4.06082     4.09546
    2.01100     2.01100     2.70217     2.70217     2.70217     2.76222     2.70877
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     6
    3.48400     3.48400     4.09974     4.09974     4.09974     4.09974     4.09974
    2.01100     2.01100     2.70217     2.70217     2.70217     2.70217     2.70217
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000

LEVEL 26       BASE AT      4648.200 METERS
EAST-WEST ROW     1
    3.48400     3.48400     3.48400     3.81607     3.87115     3.87115     3.87115
    2.01100     2.01100     2.01100     2.20313     2.23500     2.23500     2.23500
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     2
    3.48400     3.48400     3.59396     3.87115     3.87115     3.87115     3.87115
    2.01100     2.01100     2.07462     2.23500     2.23500     2.23500     2.23500
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     3
    3.48400     3.48400     3.48400     3.87115     3.87115     4.03994     4.11800
    2.01100     2.01100     2.01100     2.23500     2.23500     2.53517     2.67400
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     4
    3.48400     3.48400     3.48400     4.11800     3.98671     4.11800     4.11800
    2.01100     2.01100     2.01100     2.67400     2.44052     2.67400     2.67400
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     5
    3.48400     3.48400     4.11800     4.11800     4.11800     4.11800     4.11800
    2.01100     2.01100     2.67400     2.67400     2.67400     2.67400     2.67400
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     6
    3.48400     3.48400     4.11800     4.11800     4.11800     4.11800     4.11800
    2.01100     2.01100     2.67400     2.67400     2.67400     2.67400     2.67400
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000

LEVEL 27       BASE AT      4800.600 METERS
EAST-WEST ROW     1
    3.48400     3.48400     3.48400     3.81607     3.87115     3.87115     3.87115
    2.01100     2.01100     2.01100     2.20313     2.23500     2.23500     2.23500
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     2
    3.48400     3.48400     3.59396     3.87115     3.87115     3.87115     3.87115
    2.01100     2.01100     2.07462     2.23500     2.23500     2.23500     2.23500
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     3
    3.48400     3.48400     3.48400     3.87115     3.87115     4.21698     4.39778
    2.01100     2.01100     2.01100     2.23500     2.23500     2.29036     2.31930
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW     4
    3.48400     3.48400     3.48400     4.39778     4.10170     4.39778     4.39778
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2.01100	2.01100	2.01100	2.31930	2.27191	2.31930	2.31930
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
3.48400	3.48400	4.39778	4.39778	4.39778	4.35310	4.39287
2.01100	2.01100	2.31930	2.31930	2.31930	2.36364	2.32418
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
3.48400	3.48400	4.39778	4.39778	4.39778	4.39778	4.39778
2.01100	2.01100	2.31930	2.31930	2.31930	2.31930	2.31930
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 28 BASE AT 4953.000 METERS

EAST-WEST ROW	1					
3.48400	3.48400	3.48400	3.81607	3.87115	3.87115	3.87115
2.01100	2.01100	2.01100	2.20313	2.23500	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
3.48400	3.48400	3.59396	3.87115	3.87115	3.87115	3.87115
2.01100	2.01100	2.07462	2.23500	2.23500	2.23500	2.23500
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
3.48400	3.48400	3.48400	3.87115	3.87115	4.45122	4.71950
2.01100	2.01100	2.01100	2.23500	2.23500	2.02167	1.92300
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
3.48400	3.48400	3.48400	4.71950	4.26830	4.71950	4.71950
2.01100	2.01100	2.01100	1.92300	2.08894	1.92300	1.92300
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
3.48400	3.48400	4.71950	4.71950	4.71950	4.71950	4.71950
2.01100	2.01100	1.92300	1.92300	1.92300	1.92300	1.92300
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	6					
3.48400	3.48400	4.71950	4.71950	4.71950	4.71950	4.71950
2.01100	2.01100	1.92300	1.92300	1.92300	1.92300	1.92300
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 29 BASE AT 5105.400 METERS

EAST-WEST ROW	1					
5.26350	5.26350	5.26350	5.46459	5.49795	5.49795	5.49795
0.38200	0.38200	0.38200	0.74552	0.80582	0.80582	0.80582
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	2					
5.26350	5.26350	5.33009	5.49795	5.49795	5.49795	5.49795
0.38200	0.38200	0.50238	0.80582	0.80582	0.80582	0.80582
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	3					
5.26350	5.26350	5.26350	5.49795	5.49795	5.07030	5.31143
0.38200	0.38200	0.38200	0.80582	0.80582	1.49343	1.34430
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	4					
5.26350	5.26350	5.26350	5.31143	5.24452	5.31143	5.31143
0.38200	0.38200	0.38200	1.34430	1.19453	1.34430	1.34430
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
EAST-WEST ROW	5					
5.26350	5.26350	5.31143	5.31143	5.31143	5.26974	5.30685
0.38200	0.38200	1.34430	1.34430	1.34430	1.35827	1.34584
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

```
EAST-WEST ROW      6
     5.26350     5.26350     5.31143     5.31143     5.31143     5.31143     5.31143
     0.38200     0.38200     1.34430     1.34430     1.34430     1.34430     1.34430
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000

LEVEL 30        BASE AT      5257.800 METERS
EAST-WEST ROW      1
     7.04300     7.04300     7.04300     7.11312     7.12475     7.12475     7.12475
    -1.24700    -1.24700    -1.24700    -0.71210    -0.62337    -0.62337    -0.62337
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      2
     7.04300     7.04300     7.06622     7.12475     7.12475     7.12475     7.12475
    -1.24700    -1.24700    -1.06987    -0.62337    -0.62337    -0.62337    -0.62337
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      3
     7.04300     7.04300     7.04300     7.12475     7.12475     6.31638     5.94250
    -1.24700    -1.24700    -1.24700    -0.62337    -0.62337     0.31739     0.75250
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      4
     7.04300     7.04300     7.04300     5.94250     6.57129     5.94250     5.94250
    -1.24700    -1.24700    -1.24700     0.75250     0.02074     0.75250     0.75250
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      5
     7.04300     7.04300     5.94250     5.94250     5.94250     5.94250     5.94250
    -1.24700    -1.24700     0.75250     0.75250     0.75250     0.75250     0.75250
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      6
     7.04300     7.04300     5.94250     5.94250     5.94250     5.94250     5.94250
    -1.24700    -1.24700     0.75250     0.75250     0.75250     0.75250     0.75250
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000

LEVEL 31        BASE AT      5410.200 METERS
EAST-WEST ROW      1
     7.04300     7.04300     7.04300     7.11312     7.12475     7.12475     7.12475
    -1.24700    -1.24700    -1.24700    -0.71210    -0.62337    -0.62337    -0.62337
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      2
     7.04300     7.04300     7.06622     7.12475     7.12475     7.12475     7.12475
    -1.24700    -1.24700    -1.06987    -0.62337    -0.62337    -0.62337    -0.62337
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      3
     7.04300     7.04300     7.04300     7.12475     7.12475     6.80520     6.86775
    -1.24700    -1.24700    -1.24700    -0.62337    -0.62337    -0.17188    -0.19675
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      4
     7.04300     7.04300     7.04300     6.28094     6.91172     6.86775     6.86775
    -1.24700    -1.24700    -1.24700     0.47006    -0.32238    -0.19675    -0.19675
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      5
     7.04300     7.04300     6.28094     6.28094     6.28094     6.65919     6.64044
    -1.24700    -1.24700     0.47006     0.47006     0.47006     0.08106     0.06603
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      6
     7.04300     7.04300     6.28094     6.28094     6.28094     6.63813     6.63813
    -1.24700    -1.24700     0.47006     0.47006     0.47006     0.06417     0.06417
     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
```

LEVEL 32 BASE AT 5562.600 METERS

EAST-WEST ROW 1

7.04300	7.04300	7.04300	7.11312	7.12475	7.12475	7.12475
-1.24700	-1.24700	-1.24700	-0.71210	-0.62337	-0.62337	-0.62337
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 2

7.04300	7.04300	7.06622	7.12475	7.12475	7.12475	7.12475
-1.24700	-1.24700	-1.06987	-0.62337	-0.62337	-0.62337	-0.62337
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 3

7.04300	7.04300	7.04300	7.12475	7.12475	7.42481	7.51733
-1.24700	-1.24700	-1.24700	-0.62337	-0.62337	-0.82895	-0.89233
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW [illegible]

7.04300	7.04300	7.04300	6.70400	7.34814	7.51733	7.51733
-1.24700	-1.24700	-1.24700	0.11700	-0.77642	-0.89233	-0.89233
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 5

7.04300	7.04300	6.70400	6.70400	6.70400	7.31400	7.31400
-1.24700	-1.24700	0.11700	0.11700	0.11700	-0.64000	-0.64000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 6

7.04300	7.04300	6.70400	6.70400	6.70400	7.31400	7.31400
-1.24700	-1.24700	0.11700	0.11700	0.11700	-0.64000	-0.64000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LEVEL 33 BASE AT 5715.000 METERS

EAST-WEST ROW 1

9.90450	9.90450	9.90450	9.13440	9.00666	9.00666	9.00666
-1.74900	-1.74900	-1.74900	-1.59426	-1.56859	-1.56859	-1.56859
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 2

9.90450	9.90450	9.64949	9.00666	9.00666	9.00666	9.00666
-1.74900	-1.74900	-1.69776	-1.56859	-1.56859	-1.56859	-1.56859
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 3

9.90450	9.90450	9.90450	9.00666	9.00666	7.90081	7.90081
-1.74900	-1.74900	-1.74900	-1.56859	-1.56859	-1.373[illegible]	-1.37394
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 4

9.90450	9.90450	9.90450	7.84050	8.42891	7.90081	7.90081
-1.74900	-1.74900	-1.74900	-1.31400	-1.47702	-1.37394	-1.37394
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 5

9.90450	9.90450	7.84050	7.84050	7.84050	7.77002	7.88897
-1.74900	-1.74900	-1.31400	-1.31400	-1.31400	-1.20591	-1.36218
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 6

9.90450	9.90450	7.84050	7.84050	7.84050	7.88770	7.88770
-1.74900	-1.74900	-1.31400	-1.31400	-1.31400	-1.36091	-1.36091
0.00000	0.00000	0.0[illegible]00	0.00000	0.00000	0.00000	0.00000

LEVEL 34 BASE AT 5867.400 METERS

EAST-WEST ROW 1

12.76600	12.76600	12.76600	11.15569	10.88858	10.88858	10.88858
-2.25100	-2.25100	-2.25100	-2.47643	-2.51382	-2.51382	-2.51382
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

EAST-WEST ROW 2

```
   12.76600    12.76600    12.23275    10.88858    10.88858    10.88858    10.88858
    2.25100    -2.25100    -2.32565    -2.51382    -2.51382    -2.51382    -2.51382
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      3
   12.76600    12.76600    12.76600    10.88858    10.88858     8.84094     8.27500
   -2.25100    -2.25100    -2.25100    -2.51382    -2.51382    -2.00364    -1.84633
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      4
   12.76600    12.76600    12.76600     8.97700     9.40139     8.27500     8.27500
   -2.25100    -2.25100    -2.25100    -2.74500    -2.13400    -1.84633    -1.84633
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      5
   12.76600    12.76600     8.97700     8.97700     8.97700     8.21150     8.41865
   -2.25100    -2.25100    -2.74500    -2.74500    -2.74500    -1.76504    -2.03022
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      6
   12.76600    12.76600     8.97700     9.97700     8.97700     8.45050     8.45050
   -2.25100    -2.25100    -2.74500    -2.74500    -2.74500    -2.07100    -2.07100
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000

LEVEL 35          BASE AT        6019.800 METERS
EAST-WEST ROW      1
   12.76600    12.76600    12.76600    11.15569    10.88858    10.88858    10.88858
   -2.25100    -2.25100    -2.25100    -2.47643    -2.51382    -2.51382    -2.51382
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      2
   12.76600    12.76600    12.23275    10.88858    10.88858    10.88858    10.88858
   -2.25100    -2.25100    -2.32565    -2.51382    -2.51382    -2.51382    -2.51382
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      3
   12.76600    12.76600    12.76600    10.88858    10.88858     9.33266     8.51917
   -2.25100    -2.25100    -2.25100    -2.51382    -2.51382    -2.28076    -2.15891
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      4
   12.76600    12.76600    12.76600     8.97700     9.85131     8.51917     8.51917
   -2.25100    -2.25100    -2.25100    -2.74500    -2.35845    -2.15891    -2.15891
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      5
   12.76600    12.76600     8.97700     8.97700     8.97700     8.68450     8.68450
   -2.25100    -2.25100    -2.74500    -2.74500    -2.74500    -2.37056    -2.37056
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
EAST-WEST ROW      6
   12.76600    12.76600     8.97700     8.97700     8.97700     8.68450     8.68450
   -2.25100    -2.25100    -2.74500    -2.74500    -2.74500    -2.37056    -2.37056
    0.00000     0.00000     0.00000     0.00000     0.00000     0.00000     0.00000
ENTERING LINK 7

DAVIES EQUATIONS ARE INACCURATE FOR      7796.453 MICRONS AT      965.115 METERS

DAVIES EQUATIONS ARE INACCURATE FOR      7796.453 MICRONS AT      938.175 METERS
ENTERING LINK 5
 108    2   34   58    0    0    0    0
  58    1  142    0    0    0    0    0

TRANSPORT IS COMPLETED. INTERMEDIATE RESULTS ARE ON TAPE  9
ENTERING LINK 8
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THE DEPARTMENT OF DEFENSE FALLOUT PREDICTION SYSTEM

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OUTPUT PROCESSOR MODULE

PREPARED BY
TECHNICAL OPERATIONS RESEARCH, INC.
BURLINGTON, MASS.

LISTING OF GROUNDED PARTICLES

TRANSPORT IDENTIFICATION

SHORT TEST SET FOR THE DELFIC MODEL 26 JUN 67 TRANSPORT

BLOCK 1

NO. OF PARTICLES IN THIS BLOCK IS 58

X	Y	T	PS	MASS
999997.8281	1000003.6406	12.6401	7796.4535	0.1495
1001006.6641	1000199.3047	616.1543	436.73[illegible]	0.1495
10[illegible]3482.5859	1001139.7656	936.5776	436.7314	0.1495
1005203.9141	1001466.0859	1334.5025	258.2460	0.1495
1008080.5078	1002583.1094	1950.5395	258.2460	0.0125
1008155.2969	1001652.[illegible]063	1936.2210	256.2460	[illegible].0125
1007309.3906	1001794.9766	1925.8497	258.2460	0.01[illegible]
1007390.2266	1002393.8359	1947.2366	258.2460	0.012[illegible]
1008784.5234	1002744.8047	1948.0114	258.2460	0.0125
1008904.7969	1001550.2500	1940.3279	258.2[illegible]0	0.0[illegible]25
1006510.1797	1001897.8984	1921.0882	258.24[illegible]	0.0125
1006721.6406	1002317.2813	1935.1363	258.2460	0.0125
1008068.9531	1003301.0234	1946.1854	258.2460	0.0125
1008155.2969	1000932.5859	1936.2210	258.2460	0.0125
1007309.3906	1001074.6563	1925.8497	258.2460	0.0125
1007368.2891	1003115.9219	1939.5635	258.2460	0.0125
1008257.7188	1003540.5078	2456.1793	17[illegible].6829	0.1495
1012879.2734	1007094.6250	3523.4998	171.6829	0.0125
1012972.5234	1006471.9141	3501.8293	171.6829	0.0125
1012387.5547	1005861.1719	3505.4303	171.6829	0.0125
1012414.8984	1006632.7188	3515.9958	171.6829	0.0125
1013646.1328	1007405.7891	3525.2151	1[illegible].6829	0.0125
1013699.7500	10067[illegible].9453	3516.7920	171.6829	0.0[illegible]25
1011935.9922	1005310.8828	3523.2340	171.6929	0.0125
1011941.9531	1006041.6719	[illegible]527.6475	171.6829	0.012[illegible]
1012870.3750	1007802.9453	3520.8391	171.6629	0.0125
1012999.0625	1005835.8828	3506.6046	171.6829	0.0125

1012362.0156	1005108.7734	3498.5537	171.6829	0.0125
1012246.4688	1007136.4219	3516.6944	171.6829	0.0125
1014490.5547	1009817.9509	4301.2930	119.3953	0.0374
1015002.4766	1004085.7188	4312.6526	119.3953	0.0374
1014282.7422	1008858.0938	4312.4261	119.3953	0.0374
1014270.2969	1009582.8516	4306.6454	119.3953	0.0374
1020817.2734	1012991.3750	6001.0388	119.3953	0.0125
1021020.6250	1012219.8750	6020.9327	119.3953	0.0125
1020611.0938	1011861.2188	6002.8088	119.3953	0.0125
1020436.5859	1012703.7422	5992.0393	119.3953	0.0125
1021412.1406	1013306.8594	6002.8500	119.3953	0.0125
1021642.3047	1012511.2578	6018.1690	119.3953	0.0125
1020285.9219	1011481.6406	5996.1555	119.3953	0.0125
1020250.0000	1012407.9609	6010.2584	119.3953	0.0125
1020616.9609	1013799.7969	6002.3202	119.3953	0.0125
1021037.4844	1011089.9141	6004.1946	119.3953	0.0125
1020592.1016	1010857.5234	5997.4793	119.3953	0.0125
1020250.0000	1013517.0547	5995.4020	119.3953	0 0125
1025281.5781	1017660.2813	7738.8483	84.0749	0.0125
1024737.5391	1017243.1172	7726.5308	84.0749	0.0125
1024033.2188	1017263.9844	7725.9723	84.0749	0.0125
1024366.2109	1017874.6172	7726.6324	84.0749	0.0125
1026508.4844	1017294.2891	7742.0187	84.0749	0.0125
1025884.2500	1016840.2734	7734.7042	84.0749	0.0125
1023261.9922	1017237.4922	7721.6450	84.0749	0.0125
1023605.3516	1017852.2188	7732.3263	84.0749	0.0125
1025757.4219	1018128.6641	7726.7371	84.0749	0.0125
1024297.8516	1016755.6563	7738.4600	84.0749	0.0125
1023597.6250	1016765.2813	7729.7220	84.0749	0.0125
1024677.1953	1018489.6797	7718.7794	84.0749	0.0125
999999.1953	1000001.6719	4.5563	7796.4535	0.1495

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THE DEPARTMENT OF DEFENSE FALLOUT PREDICTION SYSTEM

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OUTPUT PROCESSOR MODULE

PREPARED BY
TECHNICAL OPERATIONS RESEARCH, INC.
BURLINGTON, MASS.

**** SUMMARY OF INPUT IDENTIFIERS AND INITIAL CONDITIONS ****

**** OUTPUT PROCESSOR IDENTIFICATION ****
SHORT TEST SET FOR THE DELFIC MODEL 26 JUN 67 CPP

**** INITIAL CONDITIONS (FIREBALL) IDENTIFICATION ****
SHORT TEST SET FOR THE DELFIC MODEL 26 JUN 67 INIT. COND.

**** CLOUD RISE IDENTIFICATION ****
SHORT TEST SET FOR THE DELFIC MODEL 26 JUN 67 CLOUD RISE

**** PARTICLE SET EXPANSION IDENTIFICATION ****
SHORT TEST SET FOR THE DELFIC MODEL 26 JUN 67 PSE

**** TRANSPORT IDENTIFICATION ****
SHORT TEST SET FOR THE DELFIC MODEL 26 JUN 67 TRANSPORT

**** WIND IDENTIFICATION ****
TEST SET WINDFIELD

**** TOPOGRAPHY IDENTIFICATION ****

**** OTHER INPUTS ****

**** THE CONTROL VARIABLE ARRAY, IC(J), WAS GIVEN THE FOLLOWING VALUES ****
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 0 0 1

THE FOLLOWING LOGICAL TAPES ARE AVAILABLE FOR SORTING.
1 3 4 10 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0

PRINTER DESCRIPTION - CHARACTERS PER INCH
HORIZONTAL 10 VERTICAL 6

THE DIFFUSION CONSTANT IS 2.00000

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THE DEPARTMENT OF DEFENSE FALLOUT PREDICTION SYSTEM

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PARTICLE ACTIVITY MODULE

PREPARED BY
US ARMY NUCLEAR DEFENSE LABORATORY
EDGEWOOD ARSENAL, MARYLAND

PARTICLE ACTIVITY MODULE 26 JUN 67

CONTROL VARIABLE ARRAYS

IFTAPE(I)

T T F F F F F F F F

NPRNT(I)

F T T T T T F T T T T T T F T

TOTAL YIELD IS 2.0000E 00 KILOTONS.

FISSION YIELD IS 1.0000E 00 KILOTONS.

TYPE OF FISSION IS P239HE

THE HEIGHT OF BURST IS 10.000 FEET.

CAPTURE - TO - FISSION RATIO IS 0.000

NUMBER OF NEUTRONS EMITTED PER FISSION IS 1.400

THE CLOUD REACHED THE SOIL CONDENSATION TEMPERATURE OF 2200.0 AT 3.86 SEC.

THERE ARE 10 PARTICLE CLASSES WITH SIGMA OF 1.3863.

INTERMEDIATE OUTPUT OF SETUP

INUC	NUCLID	DCON
1	510033010004	6.931E 01
2	510034010004	1.980E-01
3	510035010004	6.931E-02
4	510035010004	4.141E-06
5	510037010004	1.366E-05
6	[illegible]0040000004	0.000E-39
7	511033010004	6.931E 01
8	511034010004	3.466E-01
9	511035010004	9.902E-02
10	511036010004	5.776E-03
11	511037020004	4.011E-05
12	511040130004	1.308E 00
13	511040000004	0.000E-39
14	512033010004	6.931E 01
15	512034010004	4.621E-01
16	512035010004	1.733E-01
17	512036010004	2.567E-03
18	512037010004	1.481E-03
19	512040000004	0.000E-39
20	513033010004	6.931E 01
21	513034010004	6.931E 01
22	513035010004	2.773E-01
23	513036010004	7.296E-02
24	513037020004	5.776E-03
25	513040130004	1.415E-02
26	513040010004	1.409E-04
27	513041000004	0.000E-39
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176	[illegible]	[illegible]
177	[illegible]	[illegible]

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189	541045010004	6.931E 01
190	541046010004	4.621E-01
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197	542045010004	6.931E 01
198	542046010004	6.931E-01
199	542047010004	2.773E-01
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207	543050010004	4.332E-01
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237	547051010004	1.733E-01

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263	552051010004	4.621E-01
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283	554054010004	2.687E-03
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337	563055010004	2.773E-01
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354	565055010004	4.621E-01
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366	566057010004	2.773E 0?
367	566060010004	2.310E-04
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373	567056010004	2.310E-01
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540	614065010004	4.621E-01
541	614066010004	4.332E-02
542	614067010004	1.050E-02
543	614070010004	6.268E-07
544	614071010004	4.790E-06
545	614072000004	0.000E-39
546	615065010004	6.931E 01
547	615066010004	4.077E-01
548	615067010004	2.773E-02
549	615070010004	6.418E-04
550	615071010004	5.067E-05
551	615072010004	2.431E-07
552	615073000004	0.000E-39
553	616065010004	6.931E 01
554	616066010004	4.621E-01
555	616067010004	8.664E-02
556	616070010004	1.155E-03
557	616071010004	1.375E-04
558	616072000004	0.000E-39
559	617065010004	6.931E 01
560	617066010004	6.931E-01
561	617067010004	3.466E-01
562	617070010004	5.332E-02
563	617071010004	6.418E-04
564	617072010004	5.835E-06
565	617073010004	5.813E-07
566	617074000004	0.000E-39
567	620066010004	6.931E 01
568	620067010004	4.621E-01
569	620070010004	1.980E-01
570	620071010004	4.621E-02
571	620072010004	2.815E-08
572	620073010004	6.678E-04
573	620074000004	0.000E-39
574	621066010004	6.931E 01
575	621067010004	6.931E-01
576	621070010004	3.466E-01
577	621071010004	7.702E-02
578	621072010004	3.851E-03
579	621073010004	3.220E-05
580	621074000004	0.000E-39
581	622066010004	6.931E 01
582	622067010004	6.931E 01
583	622070010004	4.621E-01
584	622071010004	1.733E-01
585	622072010004	8.311E-04
586	622073010004	4.735E-04
587	622074000004	0.000E-39
588	623067010004	6.931E 01
589	623070010004	6.931E-01
590	623071010004	3.466E-01
591	623072010004	9.627E-03
592	623073010004	9.627E-04
593	623074010004	7.228E-07
594	623075010004	8.448E-09
595	623076000004	0.000E-39
596	624067010004	6.931E 01
597	624070010004	6.931E-01

598	624071010004	3.466E-01
599	624072010004	1.733E-02
600	624073010004	5.924E-03
601	624074000004	0.000E-39
602	624075010004	1.486E-06
603	624076000004	0.000E-39
604	625070010004	6.931E 01
605	625071010004	4.621E-01
606	625072010004	1.980E-01
607	625073010004	2.310E-02
608	625074010004	9.627E-05
609	625075010004	3.626E-06
610	625076000004	0.000E-39
611	626070010004	6.931E 01
612	626071010004	4.621E-01
613	626072010004	2.773E-01
614	626073010004	4.621E-02
615	626074000004	0.000E-39
616	626075010004	7.131E-05
617	626076000004	0.000E-39
618	627071010004	6.931E-01
619	627072010004	3.466E-01
620	627073010004	9.902E-02
621	627074010004	8.886E-04
622	627075010004	6.780E-06
623	627076010004	2.746E-10
624	627077000004	0.000E-39
625	630071010004	6.931E 01
626	630072010004	4.621E-01
627	630073010004	1.386E-01
628	630074010004	3.851E-03
629	630075010004	1.925E-03
630	630076000004	0.000E-39
631	630077171002	2.070E-05
632	630077071002	1.690E-09
633	630100000004	0.000E-39
634	631071010004	6.931E 01
635	631072010004	4.621E-01
636	631073010004	2.310E-01
637	631074010004	3.851E-02
638	631075010004	2.100E-03
639	631076010004	4.097E-06
640	631077000004	0.000E-39
641	632072010004	6.931E-01
642	632073010004	3.466E-01
643	632074010004	5.776E-02
644	632075010004	4.621E-03
645	632076000004	0.000E-39
646	632077010004	1.373E-09
647	632100000004	0.000E-39
648	633072010004	6.931E 01
649	633073010004	3.466E-01
650	633074010004	1.386E-01
651	633075010004	1.1[illegible]-02
652	633076010004	4.[illegible]-04
653	633077010004	1.292E-08
654	633100000004	0.000E-39
655	634073010004	4.621E-01
656	634074010004	1.540E-01
657	634075010004	2.[illegible]-02

658	634076010004	1.925E-05
659	634077010004	5.209E-07
660	634100000004	0.000E-39
661	635073010004	6.931E 01
662	635074010004	2.310E-01
663	635075010004	5.332E-02
664	635076010004	2.310E-02
665	635077010004	1.284E-05
666	635100000004	0.000E-39
667	636073010004	6.931E 01
668	636074010004	3.466E-01
669	636075010004	1.155E-01
670	636076010004	7.702E-04
671	636077010004	1.925E-04
672	636100000004	0.000E-39
673	637074010004	4.621E-01
674	637075010004	1.980E-01
675	637076010004	4.951E-02
676	637077010004	5.776E-04
677	637100010004	1.070E-05
678	637101000004	0.000E-39
679	640074010004	6.931E 01
680	640075010004	2.773E-01
681	640076010004	4.621E-02
682	640077010004	4.621E-03
683	640100000004	0.000E-39
684	640101010004	1.099E-07
685	640102000004	0.000E-39
686	641074010004	6.931E 01
687	641075010004	3.466E-01
688	641076010004	1.733E-01
689	641077010004	3.151E-02
690	641100010004	3.122E-03
691	641101010004	1.163E-06
692	641102000004	0.000E-39

OUTPUT OF SETUP

NUC	NUCLID	DCON
1	510033010004	6.931E 01
2	110034010004	1.980E-01
3	110035010004	6.931E-02
4	110036010004	4.141E-06
5	110037010004	1.366E-05
6	110040000004	0.000E-39
7	511033010004	6.931E 01
8	111034010004	3.466E-01
9	111035010004	9.902E-02
10	111036010004	5.776E-03
11	111037010004	4.011E-05
12	111040110004	1.308E 00
13	111040000004	0.000E-39
14	512033010004	6.931E 01
15	112034010004	4.621E-01
16	112035010004	1.733E-01
17	112036010004	2.567E-03
18	112037010004	1.481E-03
19	112040000004	0.000E-39
20	513033010004	6.931E 01
21	113034010004	6.931E 01
22	113035010004	2.773E-01
23	113036010004	7.296E-02
24	113037010004	5.776E-03
25	113040110004	1.415E-02
26	113040010004	1.409E-04
27	113041000004	0.000E-39
28	514034010004	6.931E 01
29	114035010004	3.466E-01
30	114036010004	8.664E-02
31	114037010004	2.310E-02
32	114040000004	0.000E-39
33	514041010004	7.266E-06
34	114042000004	0.000E-39
35	515034010004	6.931E 01
36	115035010004	4.621E-01
37	115036010004	1.980E-01
38	115037012002	4.621E-02
39	115040112002	1.284E-02
40	115040010004	1.704E-05
41	115041010004	4.975E-06
42	115042000004	0.000E-39
43	516034010004	6.931E 01
44	116035010004	6.931E 01
45	116036010004	2.773E-01
46	116037010004	8.664E-02
47	116040012002	9.169E-05
48	116041110004	1.925E-03
49	116041010004	1.269E-04
50	116042000004	0.000E-39
51	517035010004	[illegible]E 01
52	117036010004	4.621E-01
53	117037010004	1.540E-01
54	117040010004	2.773E-02
55	117041010004	[illegible]E-03
56	117042110004	2.970E-03
57	117042010004	[illegible]E-13

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58	117043000004	0.000E-39
59	520035010004	6.931E 01
60	120036010004	4.621E-01
61	120037010004	2.310E-01
62	120040010004	2.773E-02
63	120041010004	1.925E-02
64	120042000004	0.000E-39
65	521035010004	6.931E 01
66	121036010004	6.931E 01
67	121037010004	3.466E-01
68	121040010004	9.902E-02
69	121041012002	2.100E-02
70	121042110004	2.027E-04
71	121042010004	6.418E-04
72	121043000004	0.000E-39
73	522036010004	6.931E 01
74	122037010004	4.621E-01
75	122040010004	1.386E-01
76	122041010004	3.851E-02
77	122042000004	0.000E-39
78	522043010004	5.363E-06
79	122044000004	0.000E-39
80	523036010004	6.931E 01
81	123037010004	6.931E 01
82	123040010004	3.466E-01
83	123041012002	9.902E-02
84	123042112002	1.005E-02
85	123042010004	4.621E-04
86	123043010004	8.023E-05
87	123044110004	1.013E-04
88	123044000004	0.000E-39
89	524037010004	6.931E 01
90	124040010004	4.621E-01
91	124041010004	1.733E-01
92	124042010004	3.851E-03
93	124043010004	3.610E-04
94	124044000004	0.000E-39
95	525037010004	6.931E 01
96	125040010004	6.931E-01
97	125041010004	1.612E 00
98	125042010004	1.777E-02
99	125043010004	3.851E-03
100	125044112002	4.376E-05
101	125044010004	2.072E-09
102	125045000004	0.000E-39
103	526040010004	6.931E 01
104	126041010004	3.466E-01
105	126042010004	4.332E-02
106	126043010004	1.155E-02
107	126044000004	0.000E-39
108	526045110004	1.111E-02
109	126045010004	4.313E-07
110	126046000004	0.000E-39
111	527040010004	6.931E 01
112	127041010004	4.621E-01
113	127042010004	4.332E-02
114	127043071042	1.272E-02
115	127044010004	1.481E-04
116	127045010004	1.001E-15
117	127046000004	0.000E-39

118	530040010004	6.931E 01
119	130041010004	6.931E 01
120	130042010004	2.773E-01
121	130043061042	4.252E-02
122	130044010004	6.876E-05
123	130045010004	6.418E-04
124	130046000004	0.000E-39
125	531041010004	6.931E 01
126	131042010004	3.466E-01
127	131043051042	1.575E-01
128	131044010004	5.610E-03
129	131045010004	7.502E-04
130	131046020004	1.589E 07
131	531047110004	4.332E-02
132	131047000004	0.000E-39
133	532041010004	6.931E 01
134	132042010004	6.931E 01
135	132043071042	4.332E-01
136	132044010004	2.100E-02
137	132045010004	4.279E-03
138	132046010004	7.844E-10
139	132047010004	2.994E-06
140	132050000004	0.000E-39
141	533042010004	6.931E 01
142	133043010004	3.466E-01
143	133044010004	6.931E-02
144	133045010004	9.627E-03
145	133046012002	1.985E-05
146	133047110004	2.310E-04
147	133047010004	1.383E-07
148	133050000004	0.000E-39
149	534042010004	6.931E 01
150	134043010004	4.621E-01
151	134044010004	2.310E-01
152	134045010004	1.308E-01
153	134046010004	7.131E-05
154	134047010004	5.348E-05
155	134050000004	0.000E-39
156	535042010004	6.931E 01
157	135043010004	6.931E 01
158	135044010004	3.466E-01
159	135045010004	1.238E-01
160	135046010004	1.444E-03
161	135047010004	1.925E-05
162	135050012002	2.312E-14
163	135051110004	5.936E-09
164	135051000004	0.000E-39
165	536043010004	6.931E 01
166	136044010004	4.951E-01
167	136045010004	2.310E-01
168	136046010004	8.887E-03
169	136047010004	5.776E-04
170	136050000004	0.000E-39
171	537043010004	[illegible]
172	137044010004	6.931E 01
173	137045010004	3.466E-01
174	137046010004	1.732E-02
175	137047010004	1.193E-03
176	137050012002	1.2[illegible]E-07
177	137051110004	2.1[illegible]E-06

178	137051010004	2.292E-07
179	137052000004	0.000E-39
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181	140044010004	6.931E 01
182	140045010004	6.931E-01
183	140046010004	2.773E-01
184	140047010004	5.023E-03
185	140050000004	0.000E-39
186	540051010004	8.371E-06
187	140052000004	0.000E-39
188	541044010004	6.931E 01
189	141045010004	6.931E 01
190	141046010004	4.621E-01
191	141047010004	1.386E-01
192	141050012002	1.133E-05
193	141051110004	1.155E-02
194	141051010004	1.583E-04
195	141052000004	0.000E-39
196	542044010004	6.931E 01
197	142045010004	6.931E 01
198	142046010004	6.931E-01
199	142047010004	2.773E-01
200	142050020004	1.155E-02
201	542051120004	2.265E-04
202	142051010004	5.776E-03
203	142052000004	0.000E-39
204	543045010004	6.931E 01
205	143046010004	6.931E-01
206	143047010004	4.621E-01
207	143050010004	4.332E-01
208	143051010004	5.023E-03
209	143052012002	2.895E-06
210	143053110004	3.209E-05
211	143053010004	1.046E-13
212	143054000004	0.000E-39
213	544046010004	6.931E 01
214	144047010004	4.621E-01
215	144050010004	1.980E-01
216	144051010004	3.851E-03
217	144052000004	0.000E-39
218	544053010004	4.332E-02
219	144054000004	0.000E-39
220	545046010004	6.931E 01
221	145047010004	6.931E-01
222	145050010004	2.773E-01
223	145051010004	1.155E-02
224	145052010004	7.913E-04
225	145053010004	8.252E-04
226	145054000004	0.000E-39
227	546046010004	6.931E 01
228	146047010004	6.931E 01
229	146050010004	3.466E-01
230	146051010004	9.902E-02
231	146052012002	1.005E-03
232	146053120004	2.567E-03
233	146053010004	1.386E-01
234	146054000004	0.000E-39
235	547047010004	6.931E 01
236	147050010004	[illegible].621E-01
237	147051010004	[illegible].733E 01

238	147052010004	2.773E-02
239	147053010004	9.627E-03
240	147054012002	2.021E-07
241	147055110004	2.027E-04
242	147055000004	0.000E-39
243	550047010004	6.931E 01
244	150050010004	6.931E 01
245	150051010004	2.310E-01
246	150052010004	4.621E-03
247	150053010004	6.418E-04
248	150054000004	0.000E-39
249	550055110004	2.626E-03
250	150055010004	1.650E-02
251	150056000004	0.000E-39
252	551047010004	6.931E 01
253	151050010004	6.931E 01
254	151051010004	3.466E-01
255	151052010004	5.776E-03
256	151053010004	1.284E-03
257	151054012002	4.376E-05
258	151055110004	1.824E-02
259	151055010004	5.348E-06
260	151056000004	0.000E-39
261	552047010004	6.931E 01
262	152050010004	6.931E 01
263	152051010004	4.621E-01
264	152052010004	1.733E-01
265	152053010004	7.702E-02
266	152054020004	2.196E-08
267	552055120004	8.752E-05
268	152055010004	2.310E-02
269	152056000004	0.000E-39
270	553050010004	6.931E 01
271	153051010004	6.931E-01
272	153052010004	2.773E-01
273	153053010004	1.155E-02
274	153054012002	2.511E-03
275	153055110004	1.540E-02
276	153055010004	5.251E-04
277	153056010004	3.138E-15
278	153057000004	0.000E-39
279	554050010004	6.931E 01
280	154051010004	6.931E 01
281	154052010004	3.466E-01
282	154053010004	1.155E-02
283	154054010004	2.687E-03
284	154055010004	3.851E-0[illegible]
285	154056000004	0.000E-39
286	555050010004	6.931E 01
287	155051010004	6.931E 01
288	155052010004	4.621E-01
289	155053010004	2.773E-01
290	155054012002	4.332E-0[illegible]
291	155055110004	1.[illegible]
292	155055012002	2.[illegible]
293	155056110004	2.4[illegible]E-03
294	155056010004	1.37[illegible]E-05
295	155057110004	1.777E-02
296	155057000004	0.000E-39
297	[illegible]051010004	6.[illegible]E 01

298	156052010004	6.931E-01
299	156053010004	3.466E-01
300	156054010004	6.931E-02
301	156055010004	1.386E-01
302	156056000004	0.000E-39
303	557051010004	6.931E 01
304	157052010004	6.931E 01
305	157053010004	4.621E-01
306	157054010004	1.733E-01
307	157055012002	5.776E-02
308	157056112002	3.501E-05
309	157056012002	5.023E-04
310	157057110004	9.367E-03
311	157057010004	1.056E-06
312	157060000004	0.000E-39
313	560052010004	6.931E 01
314	160053010004	4.621E-01
315	160054010004	2.310E-01
316	160055010004	9.902E-02
317	160056010004	9.169E-06
318	160057010004	6.017E-05
319	160060000004	0.000E-39
320	561052010004	6.931E 01
321	161053010004	6.931E 01
322	161054010004	3.466E-01
323	161055010004	1.733E-01
324	161056010004	9.252E-03
325	161057112002	9.627E-03
326	161057010004	3.633E-05
327	161060000004	0.000E-39
328	562052010004	6.931E 01
329	162053010004	6.931E 01
330	162054010004	4.621E-01
331	162055010004	2.310E-01
332	162056010004	4.814E-03
333	162057010004	1.386E-01
334	162060000004	0.000E-39
335	563053010004	6.931E 01
336	163054010004	6.931E-01
337	163055010004	2.773E-01
338	163056012002	1.540E-02
339	163057112301	3.466E-02
340	163057012002	5.501E-04
341	163060130004	1.866E-07
342	163060010004	3.633E-06
343	163061112002	4.269E-05
344	163061010004	1.000E-15
345	163062000004	0.000E-39
346	564053010004	6.931E 01
347	164054010004	6.931E 01
348	164055010004	3.466E-01
349	164056010004	6.931E-02
350	164057010004	4.621E-03
351	164060000004	0.000E-39
352	565053010004	6.931E 01
353	165054010004	6.931E 01
354	165055010004	4.621E-01
355	165056010004	1.386E-01
356	165057012002	1.050E-02
357	165060112301	6.418E-05

358	165060010004	2.310E-04
359	165061113201	9.627E-05
360	165061020004	2.567E-04
361	165062110004	5.730E-07
362	165062000004	0.000E-39
363	566054010004	6.931E 01
364	166055010004	4.621E-01
365	166056010004	1.540E-01
366	166057010004	2.773E-02
367	166060020004	2.310E-04
368	566061120004	2.567E-03
369	166061010004	1.386E-01
370	166062000004	0.000E-39
371	567054010004	6.931E 01
372	167055010004	4.621E-01
373	167056010004	2.310E-01
374	167057012002	4.077E-02
375	167060120004	4.279E-03
376	167060010004	1.216E-03
377	167061112301	6.418E-04
378	167061010004	5.776E-03
379	167062110004	3.275E-08
380	167062000004	0.000E-39
381	570055010004	6.931E 01
382	170056010004	3.466E-01
383	170057010004	1.155E-01
384	170060010004	9.627E-04
385	170061010004	1.386E-02
386	170062000004	0.000E-39
387	571055010004	6.931E 01
388	171056010004	4.621E-01
389	171057010004	1.733E-01
390	171060012002	6.931E-02
391	171061130004	3.727E-03
392	171061020004	2.310E-02
393	571062120004	8.786E-10
394	171062010004	7.131E-06
395	171063000004	0.000E-39
396	572056010004	4.621E-01
397	172057010004	2.310E-01
398	172060010004	1.733E-02
399	172061010004	1.540E-02
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401	572063110004	2.784E-03
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404	573056010004	6.931E 01
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406	173060012002	7.702E-02
407	173061130004	1.925E-02
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409	573062120004	6.418E-08
410	173062010004	2.818E-04
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414	174060010004	6.931E-03
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423	175061012002	4.621E-02
424	175062120004	1.191E-03
425	175062010004	8.535E-07
426	175063012002	8.135E-09
427	175064110004	1.383E-07
428	175064000004	0.000E-39
429	576057010004	6.931E 01
430	176060010004	2.310E-01
431	176061010004	9.902E-02
432	176062010004	1.098E-13
433	176063112002	6.080E-04
434	176063010004	6.418E-07
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438	177061012002	2.310E-01
439	177062120004	2.751E-03
440	177062010004	8.557E-05
441	177063012002	2.061E-06
442	177064112002	7.641E-08
443	177064010004	2.070E-05
444	177065000004	0.000E-39
445	600060010004	6.931E-01
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448	200063120004	1.050E-03
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451	600065011002	4.621E-04
452	200066000004	0.000E-39
453	601060010004	6.931E 01
454	201061010004	4.621E-01
455	201062010004	1.070E-04
456	201063012002	4.186E-05
457	201064112002	1.957E-07
458	201064010004	1.605E-04
459	201065020004	1.373E-15
460	601066110004	1.003E-06
461	201066000004	0.000E-39
462	602060010004	6.931E 01
463	202061010004	4.621E-01
464	202062012002	4.443E-03
465	202063120004	1.925E-03
466	202063010004	3.122E-04
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468	602065010004	1.540E-05
469	202066000004	0.000E-39
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475	203064010004	4.814E-04
476	203065012002	9.966E-07
477	203066110004	6.685E-07

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211067012002	7.522E-10
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[illegible]	[illegible]

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542	214067010004	1.050E-02
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544	214071010004	4.790E-06
545	214072000004	0.000E-39
546	615065010004	6.931E 01
547	215066010004	4.077E-01
548	215067010004	2.773E-02
549	215070010004	6.418E-04
550	215071010004	5.067E-05
551	215072010004	2.431E-07
552	215073000004	0.000E-39
553	616065010004	6.931E 01
554	216066010004	4.621E-01
555	216067010004	8.664E-02
556	216070010004	1.155E-03
557	216071010004	1.375E-04
558	216072000004	0.000E-39
559	617065010004	6.931E 01
560	217066010004	6.931E-01
561	217067010004	3.466E-01
562	217070010004	5.332E-02
563	217071010004	6.418E-04
564	217072010004	5.835E-06
565	217073010004	5.813E-07
566	217074000004	0.000E-39
567	620066010004	6.931E 01
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569	220070010004	1.980E-01
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571	220072010004	2.815E-08
572	220073010004	6.678E-04
573	220074000004	0.000E-39
574	621066010004	6.931E 01
575	221067010004	6.931E-01
576	221070010004	3.466E-01
577	221071010004	7.702E-02
578	221072010004	3.851E-03
579	221073010004	3.220E-05
580	221074000004	0.000E-39
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582	222067010004	6.931E 01
583	222070010004	4.621E-01
584	222071010004	1.733E-01
585	222072010004	8.311E-04
586	222073010004	4.735E-04
587	222074000004	0.000E-39
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589	223070010004	6.931E-01
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591	223072010004	9.627E-03
592	223073010004	9.627E-04
593	223074010004	7.228E-07
594	223075010004	8.448E-09
595	223076000004	0.000E-39
596	624067010004	6.931E 01
597	224070010004	6.931E-01

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226073010004	4.621E-02
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226076000004	0.000E-39
227071010004	6.931E-01
227072010004	3.466E-01
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227074010004	8.886E-04
227075010004	6.780E-06
227076010004	2.746E-10
227077000004	0.000E-39
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230073010004	1.386E-01
230074010004	3.851E-02
230075010004	1.925E-03
230076000004	0.000E-39
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231071010004	6.931E 01
231072010004	4.621E-01
231073010004	2.310E-01
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231076010004	4.097E-06
231077000004	0.000E-39
232072010004	6.931E-01
232073010004	3.466E-01
232074010004	5.776E-02
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234075010004	[illegible]

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659	234077010004	5.209E-07
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661	635073010004	6.931E 01
662	235074010004	2.310E-01
663	235075010004	5.332E-02
664	235076010004	2.310E-02
665	235077010004	1.284E-05
666	235100000004	0.000E-39
667	636073010004	6.931E 01
668	236074010004	3.466E-01
669	236075010004	1.155E-01
670	236076010004	7.702E-04
671	236077010004	1.925E-04
672	236100000004	0.000E-39
673	637074010004	4.621E-01
674	237075010004	1.980E-01
675	237076010004	4.951E-02
676	237077010004	5.776E-04
677	237100010004	1.070E-05
678	237101000004	0.000E-39
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681	240076010004	4.621E-02
682	240077010004	4.621E-03
683	240100000004	0.000E-39
684	640101010004	1.099E-07
685	240102000004	0.000E-39
686	641074010004	6.931E 01
687	241075010004	3.466E-01
688	241076010004	1.733E-01
689	241077010004	3.151E-02
690	241100010004	3.122E-03
691	241101010004	1.163E-06
692	241102000004	0.000E-39

IBRA	BRANCH
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2	0.40000
3	0.36000
4	0.64000
5	0.50000
6	0.50000
7	0.06000
8	0.94000
9	0.44000
10	0.56000
11	0.10000
12	0.90000
13	0.19000
14	0.81000
15	0.03000
16	0.97000
17	0.07000
18	0.93000
19	0.11800
20	0.88200
21	0.15000

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0.20000
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0.02000
0.90000
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0.13000
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84	0.78500
85	0.99000
86	0.01000
87	0.50000
88	0.50000
89	0.22000
90	0.78000
91	0.98000
92	0.02000
93	0.97000
94	0.03000
95	0.06500
96	0.93500
97	0.17300
98	0.82700
99	0.68000
100	0.32000
101	0.90000
102	0.10000
103	0.15000
104	0.85000
105	0.20000
106	0.80000
107	0.00800
108	0.99200
109	0.72000
110	0.28000
111	0.13000
112	0.87000
113	0.02400
114	0.97600
115	0.30000
116	0.70000
117	0.04000
118	0.96000
119	0.92000
120	0.08000
121	0.03000
122	0.97000
123	0.04000
124	0.96000
125	0.75000
126	0.25000
127	0.73000
128	0.27000

[illegible] YIELDS FOR U239HE

[illegible]	CHARGE	ISOMER	YIELD PER 10,000 FISSIONS
[illegible]	27	0	-0.0000E-39
[illegible]	28	0	-0.0000E-39
72	29	0	-0.0000E-39
72	30	0	-0.0000E-39
72	31	0	-0.0000E-39
72	32	0	0.0000E-39
73	27	0	-0.0000E-39
73	28	0	-0.0000E-39
[illegible]	29	0	-0.0000E-39
73	30	0	-0.0000E-39
73	31	0	-0.0000E-39
[illegible]	32	1	-0.0000E-39
[illegible]	32	0	-0.0000E-39
74	27	0	-0.0000E-39
74	28	0	-0.0000E-39
74	29	0	-0.0000E-39
74	30	0	-0.0000E-39
74	31	0	-0.0000E-39
74	32	0	-0.0000E-39
75	27	0	-0.0000E-39
[illegible]	28	0	-0.0000E-39
75	29	0	-0.0000E-39
[illegible]	30	0	-0.0000E-39
75	31	0	-0.0000E-39
75	32	1	-0.0000E-39
75	32	0	-0.0000E-39
75	33	0	0.0000E-39
76	28	0	-0.0000E-39
76	29	0	-0.0000E-39
76	30	0	-0.0000E-39
76	31	0	-0.0000E-39
76	32	0	-0.0000E-39
76	33	0	-0.0000E-39
[illegible]	34	0	0.0000E-39
77	28	0	-0.0000E-39
77	29	0	-0.0000E-39
77	30	0	-0.0000E-39
77	31	0	-0.0000E-39
[illegible]	32	1	-0.0000E-39
[illegible]	32	0	-0.0000E-39
[illegible]	33	0	-0.0000E-39
[illegible]	34	0	0.0000E-39
[illegible]	28	0	-0.0000E-39
[illegible]	29	0	-0.0000E-39
[illegible]	30	0	-0.0000E-39
[illegible]	31	0	-0.0000E-39
[illegible]	32	0	-0.0000E-39
[illegible]	33	1	[illegible]
[illegible]	33	0	-0.0000E-39
[illegible]	34	0	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	29	[illegible]	[illegible]
[illegible]	31	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

369

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80	29	0	-0.0000E-39
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80	31	0	1.8400E 00
80	32	0	4.7800E 00
80	33	0	3.2100E 00
80	34	0	5.2500E-01
81	29	0	-0.0000E-39
81	30	0	-0.0000E-39
81	31	0	1.2900E 00
81	32	0	5.9200E 00
81	33	0	6.7200E 00
81	34	1	9.9620E-01
81	34	0	9.9620E-01
81	35	0	2.0700E-02
82	30	0	-0.0000E-39
82	31	0	5.4900E-01
82	32	0	5.3100E 00
82	33	0	1.0600E 01
82	34	0	5.3100E 00
82	35	0	5.4900E-01
82	36	0	0.0000E-39
83	30	0	-0.0000E-39
83	31	0	-0.0000E-39
83	32	0	3.5000E 00
83	33	0	1.3200E 01
83	34	1	4.5883E 00
83	34	0	7.8126E 00
83	35	0	2.8300E 00
83	36	1	-0.0000E-39
83	36	0	-0.0000E-39
84	31	0	-0.0000E-39
84	32	0	1.6800E-01
84	33	0	1.2600E 01
84	34	0	2.1400E 01
84	35	0	9.4400E 00
84	36	0	5.6200E-01
85	31	0	-0.0000E-39
85	32	0	1.1900E-02
85	33	0	8.6200E 00
85	34	0	2.7900E 01
85	35	0	2.3000E 01
85	36	1	3.0647E 00
85	36	0	3.0647E 00
85	37	0	-0.0000E-39
86	32	0	-0.0000E-39
86	33	0	5.9400E 00
86	34	0	3.1100E 01
86	35	0	4.0200E 01
86	36	0	1.3400E 01
86	37	1	1.3010E-01
86	37	0	1.3010E-01
86	38	0	0.0000E-39
87	32	0	-0.0000E-39
87	33	0	1.5800E 00
87	34	0	2.6700E 01
87	35	0	6.0500E 01
87	36	0	3.5500E 01
87	37	0	4.7500E 00
87	38	0	0.0000E-39

0	-0.0000E-39
0	-0.0000E-39
0	1.6800E 01
0	6.7200E 01
0	6.7200E 01
0	1.6800E 01
0	-0.0000E-39
0	-0.0000E-39
0	7.6600E 00
0	5.7300E 01
0	9.7500E 01
0	4.3000E 01
0	2.5600E 00
1	-0.0000E-39
0	-0.0000E-39
0	-0.0000E-39
0	1.0600E 00
0	4.1500E 01
0	1.1600E 02
0	8.3600E 01
0	1.4800E 01
0	0.0000E-39
0	0.0000E-39
0	-0.0000E-39
0	2.2500E 01
0	1.0900E 02
0	1.3519E 02
0	4.1100E 01
1	2.9840E-01
0	2.9840E-01
0	0.0000E-39
0	-0.0000E-39
0	6.4100E 00
0	9.0600E 01
0	1.7000E 02
0	9.2200E 01
0	1.1200E 01
0	0.0000E-39
0	-0.0000E-39
0	5.4500E-01
0	5.1200E 01
0	1.7700E 02
0	1.5500E 02
0.	3.3900E 01
0	-0.0000E-39
1	-0.0000E-39
0	-0.0000E-39
0	-0.0000E-39
0	2.3500E 01
0	1.4900E 02
0	2.1200E 02
0	8.2200E 01
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95	42	0	0.0000E-39
96	35	0	-0.0000E-39
96	36	0	4.3400E 01
96	37	0	1.9900E 02
96	38	0	2.2600E 02
96	39	0	6.5500E 01
96	40	0	6.9800E-01
96	41	0	-0.0000E-39
96	42	0	0.0000E-39
97	36	0	-0.0000E-39
97	37	0	-0.0000E-39
97	38	0	1.7000E 01
97	39	0	1.4100E 02
97	40	0	2.5900E 02
97	41	1	6.2513E 01
97	41	0	6.2513E 01
97	42	0	9.7300E 00
98	36	0	-0.0000E-39
98	37	0	-0.0000E-39
98	38	0	5.4800E 01
98	39	0	2.1900E 02
98	40	0	2.1900E 02
98	41	1	2.7851E 01
98	41	0	2.7851E 01
98	42	0	-0.0000E-39
99	37	0	-0.0000E-39
99	38	0	6.7500E 00
99	39	0	1.1400E 02
99	40	0	2.5700E 02
99	41	0	1.5100E 02
99	42	0	2.0200E 01
99	43	1	-0.0000E-39
99	43	0	-0.0000E-39
99	44	0	0.0000E-39
100	38	0	-0.0000E-39
100	39	0	4.0000E 01
100	40	0	1.9400E 02
100	41	0	2.3600E 02
100	42	0	7.2900E 01
100	43	0	1.0500E 00
100	44	0	0.0000E-39
101	38	0	-0.0000E-39
101	39	0	3.1200E 00
101	40	0	9.2600E 01
101	41	0	2.4100E 02
101	42	0	1.6100E 02
101	43	0	2.6500E 01
101	44	0	0.0000E-39
102	38	0	-0.0000E-39
102	39	0	-0.0000E-39
102	40	0	4.5400E 01
102	41	0	1.9600E 02
102	42	0	2.1100E 02
102	43	1	2.8512E 01
102	43	0	2.8512E 01
102	44	0	-0.0000E-39
103	39	0	-0.0000E-39
103	40	0	2.0600E 01
103	41	0	1.3900E 02

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103	44	0	4.0700E 00
103	45	1	-0.0000E-39
103	45	0	-0.0000E-39
104	39	0	-0.0000E-39
104	40	0	1.2200E 00
104	41	0	6.4400E 01
104	42	0	1.9200E 02
104	43	0	1.4900E 02
104	44	0	2.8500E 01
104	45	1	-0.0000E-39
104	45	0	-0.0000E-39
104	46	0	0.0000E-39
105	39	0	-0.0000E-39
105	40	0	5.1700E-01
105	41	0	4.8500E 01
105	42	0	1.[illegible]700E 02
105	43	0	1.4700E 02
105	44	0	3.2200E 01
105	45	1	-0.0000E-39
105	45	0	-0.0000E-39
105	46	0	0.0000E-39
106	39	0	-0.0000E-39
106	40	0	-0.0000E-39
106	41	0	3.4800E 01
106	42	0	1.3800E 02
106	43	0	1.3800E 02
106	44	0	3.4800E 01
106	45	1	-0.0000E-39
106	45	0	-0.0000E-39
106	46	0	0.0000E-39
107	40	0	-0.0000E-39
107	41	0	2.3600E 01
107	42	0	1.0800E 02
107	43	0	1.2200E 02
107	44	0	3.5600E 01
107	45	1	-0.0000E-39
107	45	0	-0.0000E-39
107	46	0	0.0000E-39
107	47	0	0.0000E-39
108	40	0	-0.0000E-39
108	41	0	3.7900E 00
108	42	0	4.7800E 01
108	43	0	1.0100E 02
108	44	0	5.4600E 01
108	45	0	6.6400E 00
108	46	0	0.0000E-39
109	40	0	-0.0000E-39
109	41	0	2.0600E-01
109	42	0	1.[illegible]E 01
109	43	0	6.[illegible]E 01
109	44	0	5.[illegible]E 01
109	[illegible]	[illegible]	[illegible]
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109	[illegible]	[illegible]	[illegible]E-39
109	[illegible]	[illegible]	[illegible]E-39
109	[illegible]	[illegible]	[illegible]E-39
[illegible]	[illegible]	[illegible]	[illegible]E-39

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110	42	0	8.1200E 00
110	43	0	4.2700E 01
110	44	0	6.3900E 01
110	45	0	2.4500E 01
110	46	0	8.2600E-01
111	41	0	-0.0000E-39
111	42	0	7.5000E-01
111	43	0	2.2300E 01
111	44	0	5.7800E 01
111	45	0	3.8800E 01
111	46	1	3.2324E 00
111	46	0	3.2324E 00
111	47	1	-0.0000E-39
111	47	0	-0.0000E-39
111	48	0	0.0000E-39
112	42	0	-0.0000E-39
112	43	0	9.6900E 00
112	44	0	4.4300E 01
112	45	0	5.0200E 01
112	46	0	1.4600E 01
112	47	0	1.5500E-01
112	48	0	0.0000E-39
113	42	0	-0.0000E-39
113	43	0	2.8000E 00
113	44	0	2.7000E 01
113	45	0	4.8100E 01
113	46	0	2.7000E 01
113	47	1	1.4231E 00
113	47	0	1.4231E 00
113	48	0	0.0000E-39
114	42	0	-0.0000E-39
114	43	0	1.5200E-01
114	44	0	1.3300E 01
114	45	0	4.5600E 01
114	46	0	4.0?00E 01
114	47	0	8.8000E 00
114	48	0	-0.0000E-39
115	43	0	-0.0000E-39
115	44	0	5.3000E 00
115	45	0	3.2300E 01
115	46	0	4.8200E 01
115	47	1	9.4532E 00
115	47	0	9.4532E 00
115	48	1	3.1770E-01
115	48	0	3.1770E-01
115	49	1	-0.0000E-39
115	49	0	-0.0000E-39
115	50	0	0.0000E-39
116	43	0	-0.0000E-39
116	44	0	6.2000E-01
116	45	0	1.8400E 01
116	46	0	4.7800E 01
116	47	0	3.2000E 01
116	48	0	5.2500E 00
117	43	0	-0.0000E-39
117	44	0	-0.0000E-39
117	45	0	9.1800E 00
117	46	0	3.9700E 01
117	47	0	4.2800E 01
117	48	1	5.7431E 00

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119	49	0	4.2082E 00
119	50	1	-0.0000E-39
119	50	0	-0.0000E-39
120	45	0	-0.0000E-39
120	46	0	5.7900E 00
120	47	0	3.2800E 01
120	48	0	4.5800E 01
120	49	0	1.6300E 01
120	50	0	-0.0000E-39
121	45	0	-0.0000E-39
121	46	0	8.7600E-01
121	47	0	1.9500E 01
121	48	0	4.7300E 01
121	49	1	1.5143E 01
121	49	0	1.5145E 01
121	50	1	2.2464E 00
121	50	0	2.2464E 00
121	51	0	0.0000E-39
122	46	0	-0.0000E-39
122	47	0	7.7200E 00
122	48	0	3.7500E 01
122	49	0	4.5400E 01
122	50	0	1.4100E 01
122	51	1	1.0220E-01
122	51	0	1.0220E-01
122	52	0	0.0000E-39
123	46	0	-0.0000E-39
123	47	0	3.4000E 00
123	48	0	2.7900E 01
123	49	1	2.6123E 01
123	49	0	2.6123E 01
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124	52	0	-0.0000E-39
125	47	0	-0.0000E-39
125	48	0	7.0000E-01
125	49	0	4.1300E 01
125	50	1	2.9173E 01
125	50	0	2.9173E 01
125	51	0	2.0400E 01
125	52	1	5.9470E-01
125	52	0	5.9470E-01
126	47	0	-0.0000E-39
126	48	0	1.0900E 00
126	49	0	2.4600E 01
126	50	0	5.9400E 01
126	51	1	1.9059E 01
126	51	0	1.9059E 01
126	52	0	5.5500E 00
127	47	0	-0.0000E-39
127	48	0	-0.0000E-39
127	49	0	1.4200E 01
127	50	1	0.0000E-39
127	50	0	6.1600E 01
127	51	0	6.6500E 01
127	52	1	8.9449E 00
127	52	0	8.9449E 00
127	53	0	-0.0000E-39
128	48	0	-0.0000E-39
128	49	0	1.2900E 01
128	50	0	6.7300E 01
128	51	1	4.4267E 01
128	51	0	4.4267E 01
128	52	0	2.9100E 01
128	53	0	5.5500E-01
128	54	0	0.0000E-39
129	48	0	-0.0000E-39
129	49	0	1.0500E 01
129	50	0	7.0700E 01
129	51	0	1.1200E 02
129	52	1	2.3531E 01
129	52	0	2.3531E 01
129	53	0	2.0700E 00
129	54	1	-0.0000E-39
129	54	0	-0.0000E-39
130	48	0	-0.0000E-39
130	49	0	1.0900E 01
130	50	0	8.0900E 01
130	51	1	0.0000E-39
130	51	0	1.3800E 02
130	52	0	6.0800E 01
130	53	0	3.6200E 00
130	54	0	0.0000E-39
131	48	0	-0.0000E-39
131	49	0	2.0700E 00
131	50	0	6.1300E 01
131	51	0	1.6000E 02
131	52	1	5.4381E 01
131	52	0	5.4381E 01
131	53	0	1.7600E 01
131	54	1	-0.0000E-39

131	54	0	-0.0000E-39
132	48	0	-0.0000E-39
132	49	0	-0.0000E-39
132	50	0	3.2900E 01
132	51	0	1.5100E 02
132	52	0	1.7100E 02
132	53	0	4.9600E 01
132	54	0	5.2900E-01
133	49	0	-0.0000E-39
133	50	0	1.4800E 01
133	51	0	1.2200E 02
133	52	1	1.1435E 02
133	52	0	1.1435E 02
133	53	0	1.0600E 02
133	54	1	4.2946E 00
133	54	0	4.2946E 00
133	55	0	0.0000E-39
134	49	0	-0.0000E-39
134	50	0	-0.0000E-39
134	51	0	4.7400E 01
134	52	0	2.0500E 02
134	53	0	2.2100E 02
134	54	0	5.8600E 01
134	55	1	-0.0000E-39
134	55	0	-0.0000E-39
134	56	0	0.0000E-39
135	50	0	-0.0000E-39
135	51	0	4.7900E 00
135	52	0	1.0700E 02
135	53	0	2.5900E 02
135	54	1	8.2842E 01
135	54	0	8.2842E 01
135	55	0	2.4200E 01
135	56	0	0.0000E-39
136	51	0	-0.0000E-39
136	52	0	3.1500E 01
136	53	0	1.7800E 02
136	54	0	2.4900E 02
136	55	0	8.3200E 01
136	56	0	2.2700E 00
137	51	0	-0.0000E-39
137	52	0	4.6900E 00
137	53	0	1.1300E 02
137	54	0	2.5500E 02
137	55	0	1.5000E 02
137	56	1	1.0165E 01
137	56	0	1.0165E 01
138	51	0	-0.0000E-39
138	52	0	-0.0000E-39
138	53	0	5.2900E 01
138	54	0	2.0700E 02
138	55	0	2.0700E 02
138	56	0	5.2[illegible] 01
139	57	0	[illegible]
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140	52	0	-0.0000E-39
140	53	0	1.9800E 00
140	54	0	7.7400E 01
140	55	0	2.1700E 02
140	56	0	1.5700E 02
140	57	0	2.7600E 01
140	58	0	0.0000E-39
141	53	0	-0.0000E-39
141	54	0	3.2800E 01
141	55	0	1.5900E 02
141	56	0	1.9300E 02
141	57	0	5.9800E 01
141	58	0	8.5300E-01
141	59	0	0.0000E-39
142	53	0	-0.0000E-39
142	54	0	7.4800E 00
142	55	0	9.4100E 01
142	56	0	1.9800E 02
142	57	0	1.0700E 02
142	58	0	1.3100E [illegible]
143	53	0	-0.0000E-39
143	54	0	5.1400E-01
143	55	0	4.8200E 01
143	56	0	1.6600E 02
143	57	0	1.4600E 02
143	58	0	3.2100E 01
143	59	0	-0.0000E-39
143	60	0	0.0000E-39
144	54	0	-0.0000E-39
144	55	0	1.8600E 01
144	56	0	1.1300E 02
144	57	0	1.7000E 02
144	58	0	6.5100E 01
144	59	0	2.2000E 00
144	60	0	0.0000E-39
145	54	0	-0.0000E-39
145	55	0	1.8900E 00
145	56	0	5.5300E 01
145	57	0	1.4400E 02
145	58	0	9.6300E 01
145	59	0	1.5800E 01
145	60	0	0.0000E-39
146	54	0	-0.0000E-39
146	55	0	-0.0000E-39
146	56	0	2.3800E 01
146	57	0	1.0300E 02
146	58	0	1.0900E 02
146	59	0	2.9400E 01
146	60	0	-0.0000E-39
147	55	0	-0.0000E-39
147	56	0	6.8100E 00
147	57	0	5.6000E 01
147	58	0	1.0300E 02
147	59	0	4.9000E 01
147	60	0	3.8900E 00
147	61	0	0.0000E-39
147	62	0	0.0000E-39
148	55	0	-0.0000E-39
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156	63	0	-0.0000E-39
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157	60	0	-0.0000E-39
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160	65	0	-0.0000E-39
160	66	0	0.0000E-39
161	60	0	-0.0000E-39
161	61	0	-0.0000E-39
161	62	0	-0.0000E-39
161	63	0	-0.0000E-39
161	64	0	-0.0000E-39
161	65	0	-0.0000E-39
161	66	0	0.0000E-39

ID	IA	IZ	IS	JRM	ERM
	72	30	0	4	-8.400E-07
	72	31	0	5	1.170E-05
	73	31	0	11	-1.890E-06
	73	32	1	12	7.790E-08
	74	30	0	17	-3.650E-06
	74	31	0	18	1.800E-05
	75	32	1	25	-3.030E-07
	75	32	0	26	1.990E-07
	76	33	0	33	-2.100E-06
10	77	32	1	39	-4.040E-07
11	77	32	0	40	5.740E-06
12	77	33	0	41	5.530E-08
13	78	32	0	47	-2.430E-06
14	78	33	1	48	2.710E-06
15	78	33	0	49	4.280E-06
16	79	34	1	56	-1.040E-07
17	81	34	1	70	-1.150E-07
18	82	35	0	78	-1.430E-05
19	83	34	1	84	-6.660E-07
20	83	34	0	85	1.490E-05
21	83	35	0	86	2.770E-07
22	83	36	1	87	2.320E-07
23	84	35	0	93	-9.170E-06
24	85	36	1	100	-9.090E-07
25	85	36	0	101	2.770E-08
26	86	37	1	108	-2.990E-06
27	86	37	0	109	4.750E-07
28	87	36	0	115	-4.100E-06
29	88	36	0	122	-7.680E-06
30	88	37	0	123	3.120E-06
31	89	36	0	128	-1.690E-05
32	89	37	0	129	1.100E-05
33	90	36	0	136	-8.990E-06
34	91	38	0	145	-4.180E-06
35	91	39	1	146	2.820E-06
36	91	39	0	147	1.730E-08
37	92	38	0	153	-5.880E-06
38	92	39	0	154	1.220E-06
39	93	38	0	160	-1.140E-06
40	93	39	0	161	4.880E-07
41	93	41	1	163	1.660E-07
42	94	39	0	169	-3.460E-06
43	95	40	0	176	-3.780E-06
44	95	41	1	177	1.330E-06
45	95	41	0	178	3.910E-06
46	96	41	0	186	-1.150E-05
47	97	40	0	192	-2.380E-07
48	97	41	1	193	3.820E-06
49	97	41	0	194	3.900E-06
50	99	42	[illegible]	[illegible]	[illegible]
51	[illegible]	43	[illegible]	[illegible]	7.4[illegible]E-07
52	100	43	[illegible]	[illegible]	[illegible]
53	101	42	[illegible]	224	-7.920E-06
54	101	43	[illegible]	225	1.9[illegible]0E-06
55	102	43	1	232	-3.350E-06
56	[illegible]	44	[illegible]	[illegible]	-2.[illegible]E-07

57	103	45	1	241	1.220E-07
58	104	45	1	249	-2.150E-07
59	104	45	0	250	3.000E-06
60	105	44	0	257	-3.880E-06
61	105	45	1	258	4.170E-07
62	105	45	0	259	1.750E-07
63	106	45	1	267	-8.680E-06
64	106	45	0	268	1.480E-06
65	107	44	0	274	-1.220E-06
66	107	45	0	276	1.740E-06
67	108	44	0	283	-2.650E-07
68	108	45	0	284	2.360E-06
69	109	45	1	291	-6.370E-07
70	109	46	1	293	6.910E-07
71	109	46	0	294	1.690E-07
72	109	47	1	295	8.050E-08
73	111	46	1	308	-3.400E-07
74	111	46	0	309	8.900E-07
75	111	47	1	310	3.770E-07
76	111	47	0	311	1.310E-07
77	112	46	0	317	-1.250E-07
78	112	47	0	318	3.240E-06
79	115	48	1	341	-1.770E-07
80	115	48	0	342	1.040E-06
81	115	49	1	343	1.020E-06
82	116	47	0	350	-6.430E-06
83	117	48	1	357	-7.080E-06
84	117	49	1	359	5.250E-07
85	117	49	0	360	3.850E-06
86	117	50	1	361	1.220E-06
87	118	49	0	369	-1.160E-06
88	119	49	1	377	-2.690E-07
89	119	49	0	378	4.070E-06
90	119	50	1	379	1.470E-07
91	120	48	0	384	-2.710E-06
92	121	49	0	392	-4.690E-06
93	122	51	1	401	-4.840E-07
94	122	51	0	402	2.020E-06
95	123	49	0	408	-5.350E-06
96	123	50	1	409	1.050E-07
97	123	50	0	410	8.320E-07
98	124	51	0	419	-8.960E-06
99	125	50	1	424	-1.960E-06
100	125	50	0	425	3.980E-07
101	125	51	0	426	2.540E-06
102	1[illegible]5	52	1	427	3.270E-07
103	126	51	0	434	-9.390E-06
104	127	50	0	440	-2.710E-06
105	127	51	0	441	2.630E-06
106	127	52	1	442	5.140E-07
107	127	52	0	443	2.340E-08
108	128	50	0	447	-2.390E-06
109	128	51	1	448	9.280E-06
110	128	53	0	451	4.900E-07
111	129	51	0	456	-5.400E-06
112	129	52	1	457	1.830E-07
113	129	52	0	458	1.250E-06
114	129	54	1	460	4.300E-07
115	130	53	0	468	-7.840E-06
116	131	51	0	473	-3.180E-06

117	131	52	1	474	9.300E-06
118	131	52	0	475	2.130E-06
119	131	53	0	476	2.210E-06
120	131	54	1	477	1.980E-07
121	132	52	0	483	-1.440E-06
122	132	53	0	484	1.120E-05
123	133	52	1	489	-1.120E-05
124	133	52	0	490	7.840E-06
125	133	53	0	491	3.140E-06
126	133	54	1	492	3.840E-07
127	133	54	0	493	3.060E-07
128	134	52	0	498	-6.840E-06
129	134	53	0	499	1.220E-05
130	134	55	1	501	7.540E-07
131	134	55	0	502	8.130E-06
132	135	53	0	507	-1.560E-05
133	135	54	1	508	2.390E-06
134	135	54	0	509	1.490E-06
135	136	53	0	514	-1.210E-05
136	136	55	0	516	1.170E-05
137	137	56	1	523	-3.180E-06
138	138	54	0	528	-4.410E-06
139	138	55	0	529	9.790E-06
140	139	54	0	535	-1.460E-06
141	139	55	0	536	1.100E-06
142	139	56	0	537	2.550E-07
143	140	55	0	542	-3.230E-06
144	140	56	0	543	1.160E-06
145	140	57	0	544	1.140E-05
146	141	56	0	549	-3.650E-06
147	141	57	0	550	1.270E-07
148	141	58	0	551	4.670E-07
149	142	56	0	556	-4.950E-06
150	142	57	0	557	6.010E-06
151	143	57	0	563	-5.740E-06
152	143	58	0	564	3.500E-06
153	144	58	0	571	-1.230E-07
154	144	59	0	572	1.400E-07
155	145	58	0	578	-3.650E-06
156	145	59	0	579	4.090E-06
157	146	58	0	585	-1.500E-06
158	146	59	0	586	6.530E-06
159	147	60	0	593	-9.600E-07
160	148	61	0	602	-5.280E-06
161	149	60	0	608	-1.220E-06
162	149	61	0	609	2.800E-08
163	150	61	0	616	-8.080E-06
164	151	60	0	621	-5.600E-06
165	151	61	0	622	1.290E-06
166	152	61	0	629	-3.400E-06
167	152	63	1	631	1.920E-06
168	152	63	0	632	5.800E-06
169	153	61	0	638	-8.040E-07
170	153	62	0	639	1.860E-07
171	154	63	0	646	-6.010E-06
172	155	62	0	652	-7.260E-07
173	155	63	0	653	2.890E-07
174	156	63	0	659	-3.020E-06
175	157	63	0	665	-3.380E-06
176	158	62	0	670	-2.710E-06

177	158	63	0	671	6.300E-06
178	159	64	0	677	-3.950E-07
179	160	65	0	684	-2.020E-06
180	161	64	0	690	-2.030E-06
181	161	65	0	691	2.430E-07

OUTPUT OF INDCC1

NUMBER OF ELEMENTS = 18

NUMBER OF NEUTRONS EMITTED PER FISSION = 1.40

INDEX	ISC	FAC	XLAM	KEV	FOG	RNY
1	4	1.002[illegible]-02	7.419E-09	1	0.00000	0.000E-39
		1.469E-01	7.461E-35	1	0.00000	0.000E-39
		3.250E-03	6.930E-31	1	0.00000	0.000E-39
		2.155E-04	1.744E-07	3	0.43000 0.03000 0.57000	6.100E-06 5.770E-06 5.380E-06
2	7	0.000E-39	3.487E-08	1	0.00000	0.000E-39
		0.000E-39	6.930E-31	1	0.00000	0.000E-39
		0.000E-39	6.930E-31	1	0.00000	0.000E-39
		0.000E-39	6.930E-31	1	0.00000	0.000E-39
		0.000E-39	6.930E-31	1	0.00000	0.000E-39
		0.000E-39	1.069E-05	1	0.00000	0.000E-39
		0.000E-39	3.208E-03	1	0.00000	0.000E-39
3	3	4.829E-02	6.930E-31	1	0.00000	0.000E-39
		8.615E-03	6.930E-31	1	0.00000	0.000E-39
		2.225E-03	7.347E-05	1	0.00700	6.040E-06
4	3	8.997E-02	1.689E-17	1	0.11000	6.700E-06
		6.150E-04	6.930E-31	1	0.00000	0.000E-39
		3.324E-03	1.552E-05	1	0.18000	6.950E-06
5	1	2.714E-03	5.022E-03	1	1.00000	7.750E-06
6	1	7.495E-03	1.283E-05	2	1.00000 1.00000	1.070E-05 6.400E-06
7	5	2.899E-04	6.930E-31	1	0.00000	0.000E-39
		7.541E-04	6.930E-31	1	0.00000	0.000E-39

		3.604E-02	6.930E-31	1	0.00000	0.000E-39
		6.379E-04	6.930E-31	1	0.00000	0.000E-39
		4.556E-05	1.991E-03	3	0.04200	4.680E-06
					0.01300	3.230E-06
					0.94500	1.750E-06
8	2	5.779E-01	6.930E-31	1	0.00000	0.000E-39
		1.498E-07	1.771E-09	1	0.00000	0.000E-39
9	4	1.167E-02	6.930E-31	1	0.00000	0.000E-39
		1.540E-02	6.930E-31	1	0.00000	0.000E-39
		8.676E-04	5.277E-08	1	0.00000	0.000E-39
		1.191E-04	1.359E-03	3	0.00600	1.576E-05
					0.01000	1.410E-05
					0.89000	1.168E-05
10	2	1.970E-02	7.130E-14	1	0.00000	0.000E-39
		8.120E-05	3.080E-04	2	0.47000	8.920E-06
					0.31000	7.140E-06
11	7	0.000E-39	2.005E-08	1	0.00000	0.000E-39
		0.000E-39	6.930E-31	1	0.00000	0.000E-39
		0.000E-39	6.930E-31	1	0.00000	0.000E-39
		0.000E-39	6.930E-31	1	0.00000	0.000E-39
		0.000E-39	6.930E-31	1	0.00000	0.000E-39
		0.000E-39	4.096E-06	1	0.00000	0.000E-39
		0.000E-39	4.813E-04	1	0.00000	0.000E-39
12	1	8.026E-03	7.461E-05	5	0.00500	1.134E-05
					0.01800	1.040E-05
					0.19500	8.840E-06
					0.28200	7.850E-06
					0.97700	4.550E-06
13	3	1.347E-03	1.283E-34	1	0.00000	0.000E-39
		1.560E-03	6.930E-31	1	0.00000	0.000E-39
		1.911E-04	1.216E-03	2	0.30000	5.050E-06
					0.70000	4.330E-06

14	2	0.000E-39	6.930E-31	1	0.00000	0.000E-39
		0.000E-39	2.310E 01	2	0.02600 0.01300	1.513E-05 1.200E-05
15	2	0.000E-39	6.930E-31	1	0.00000	0.000E-39
		0.000E-39	3.072E-03	1	1.00000	6.620E-06
16	4	1.869E-04	2.885E-07	1	0.09000	1.750E-06
		1.709E-04	6.930E-31	1	0.00000	0.000E-39
		4.384E-04	6.930E-31	1	0.00000	0.000E-39
		2.306E-06	3.208E-02	1	0.00000	0.000E-39
17	1	4.801E-04	5.609E-07	1	0.00000	0.000E-39
18	1	4.539E-04	6.930E-31	1	-0.00000	-0.000E-39

CUTPUT OF INDCC2
INDUCED ACTIVITY IN THE TRANSPORTED SOIL CONTRIBUTES 1.6528E 07 TO EACH PARTICLE SIZE.

OUTPUT OF BATMAN

NUCLID	ABUNCO
510033010004	0.0000E-39
110034010004	0.0000E-39
110035010004	0.0000E-39
110036010004	0.0000E-39
110037010004	0.0000E-39
110040000004	0.0000E-39
511033010004	0.0000E-39
111034010004	0.0000E-39
111035010004	0.0000E-39
111036010004	0.0000E-39
111037010004	0.0000E-39
111040110004	0.0000E-39
111040000004	0.0000E-39
512033010004	0.0000E-39
112034010004	0.0000E-39
112035010004	0.0000E-39
112036010004	0.0000E-39
112037010004	0.0000E-39
112040000004	0.0000E-39
513033010004	0.0000E-39
113034010004	0.0000E-39
113035010004	0.0000E-39
113036010004	0.0000E-39
113037010004	0.0000E-39
113040110004	0.0000E-39
113040010004	0.0000E-39
113041000004	0.0000E-39
514034010004	0.0000E-39
114035010004	0.0000E-39
114036010004	0.0000E-39
114037010004	0.0000E-39
114040000004	0.0000E-39
514041010004	0.0000E-39
114042000004	0.0000E-39
515034010004	0.0000E-39
115035010004	0.0000E-39
115036010004	0.0000E-39
115037012002	0.0000E-39
115040112002	0.0000E-39
115040010004	0.0000E-39
115041010004	0.0000E-39
115042000004	0.0000E-39
516034010004	0.0000E-39
116035010004	0.0000E-39
116036010004	0.0000E-39
116037010004	0.0000E-39
116040012002	0.0000E-39
116041110004	0.0000E-39
116041010004	0.0000E-39
116042000004	0.0000E-39
517035010004	0.0000E-39
117036010004	0.0000E-39
117037010004	0.0000E-39
117040010004	0.0000E-39
117041010004	0.0000E-39
117042110004	0.0000E-39
117042010004	0.0000E-39

117043000004	0.0000E-39
520035010004	0.0000E-39
120036010004	1.0416E-01
120037010004	1.0541E 00
120040010004	5.5232E 00
120041010004	3.5188E 00
120042000004	2.4971E-01
521035010004	0.0000E-39
121036010004	0.0000E-39
121037010004	3.3851E-01
121040010004	4.7978E 00
121041012002	8.1857E 00
121042110004	1.0319E 00
121042010004	1.5654E 00
121043000004	3.1509E-03
522036010004	0.0000E-39
122037010004	9.2231E-02
122040010004	3.4370E 00
122041010004	1.1289E 01
122042000004	1.6407E 00
522043010004	5.4899E-01
122044000004	1.1370E-05
523036010004	0.0000E-39
123037010004	0.0000E-39
123040010004	9.1843E-01
123041012002	1.1064E 01
123042112002	6.4484E 00
123042010004	1.0459E 01
123043010004	3.0394E 00
123044110004	9.0626E-04
123044000004	1.1474E-06
524037010004	0.0000E-39
124040010004	2.8224E-02
124041010004	6.5470E 00
124042010004	2.7226E 01
124043010004	9.7931E 00
124044000004	1.3393E-02
525037010004	0.0000E-39
125040010004	8.1941E-04
125041010004	1.7703E-02
125042010004	3.4181E 01
125043010004	2.4976E 01
125044112002	3.4205E 00
125044010004	3.0648E 00
125045000004	4.4549E-04
526040010004	0.0000E-39
126041010004	1.5587E 00
126042010004	3.0272E 01
126043010004	4.3340E 01
126044000004	1.9585E 00
526045110004	1.2444E-01
126045010004	1.3556E-01
126046000004	2.2724E-07
527040010004	0.0000E-39
[illegible]	2.6[illegible]44E-01
127042010004	2.3770E 01
127043071042	6.1741E 01
127044010064	3.9174E 01
127045010004	4.7713E 00
127046000004	9.5367E-07

130040010004	0.0000E-39
130041010004	0.0000E-39
130042010004	5.7609E 00
130043061042	6.7062E 01
130044010004	8.0856E 01
130045010004	1.6778E 01
130046000004	4.1600E-02
131041010004	0.0000E-39
131042010004	2.0100E 00
131043051042	3.5152E 01
131044010004	1.2562E 02
131045010004	4.4452E 01
131046020004	2.6865E 00
131047110004	0.0000E-39
131047000004	1.0639E-05
132041010004	0.0000E-39
132042010004	0.0000E-39
132043071042	7.9945E 00
132044010004	1.3488E 02
132045010004	9.2644E 01
132046010004	1.6254E 01
132047010004	4.6915E-08
132050000004	8.9407E-06
133042010004	0.0000E-39
133043010004	5.9042E 00
133044010004	9.7553E 01
133045010004	1.5778E 02
133046012002	4.6553E 01
133047110004	3.0014E-01
133047010004	3.0001E-01
13[illegible]0000004	1.3046E-05
134042010004	0.0000E-39
134043010004	1.0769E 00
134044010004	3.6137E 01
134045010004	1.4042E 02
134046010004	1.7154E 02
134047010004	1.1234E 01
134050000004	2.3264E-03
135042010004	0.0000E-39
135043010004	0.0000E-39
135044010004	1.3579E 01
135045010004	1.3856E 02
135046010004	2.3052E 02
135047010004	3.4981E 01
1[illegible]050012002	2.5692E-03
135051110004	1.1369E-11
135051000004	5.1260E-06
136043010004	0.0000E-39
136044010004	3.4756E 00
136045010004	7.0155E 01
136046010004	2.9693E 02
136047010004	9.0949E 01
136050000004	1.9282E-01
137042010004	0.0000E-39
137044010004	0.0000E-39
137045010004	2.3712E 01
137046010004	2.7630E 02
137047010004	1.6842E 02
137050012002	2.5714E 01
137051110004	2.4214E-07

137051010004	1.1683E-05
137052000004	2.6561E-05
540043010004	0.0000E-39
140044010004	0.0000E-39
140045010004	1.6721E 01
140046010004	1.8826E 02
140047010004	3.2500E 02
140050000004	3.9119E 00
540051010004	0.0000E-39
140052000004	0.0000E-39
541044010004	0.0000E-39
141045010004	0.0000E-39
141046010004	2.8560E 00
141047010004	9.2709E 01
141050012002	3.2142E 02
141051110004	5.9798E 01
141051010004	6.5201E 01
141052000004	3.9028E-02
542044010004	0.0000E-39
142045010004	0.0000E-39
142046010004	3.7734E 00
142047010004	1.0013E 02
142050020004	3.7513E 02
542051120004	2.7827E 01
142051010004	4.0863E 01
142052000004	7.7807E-01
543045010004	0.0000E-39
143046010004	4.6479E-01
143047010004	2.1159E 01
143050010004	8.6545E 01
143051010004	4.1463E 02
143052012002	2.6154E 01
143053110004	2.2095E-04
143053010004	5.4389E-05
143054000004	1.7732E-05
544046010004	0.0000E-39
144047010004	6.7199E 00
144050010004	1.1115E 02
144051010004	3.4771E 02
144052000004	4.4204E 00
544053010004	8.8830E-01
144054000004	1.6170E-01
545046010004	0.0000E-39
145047010004	2.1484E-01
145050010004	3.3179E 01
145051010004	2.9122E 02
145052010004	1.7260E 02
145053010004	2.6921E 01
145054000004	8.5071E-02
546046010004	0.0000E-39
146047010004	0.0000E-39
146050010004	1.1913E 01
146051010004	1.6043E 02
146052012002	2.[illegible]E 02
14605311[illegible]004	2.8706E 01
146053010004	1.7070E 01
146054000004	1.2202E 01
547047010004	0.0000E-39
147050010004	3.4607E 00
147051010004	8.2551E 01

147052010004	2.6713E 02
147053010004	1.1357E 02
147054012002	7.8563E 00
147055110004	4.5594E-06
147055000004	2.4044E-05
150047010004	0.0000E-39
150050010004	0.0000E-39
150051010004	2.6898E 01
150052010004	2.2693E 02
150053010004	1.5241E 02
150054000004	3.7326E-01
150055110004	0.0000E-39
150055010004	0.0000E-39
150056000004	0.0000E-39
151047010004	0.0000E-39
151050010004	0.0000E-39
151051010004	1.2863E 01
151052010004	1.9899E 02
151053010004	1.5043E 02
151054012002	3.2931E 01
151055110004	1.0943E-03
151055010004	4.4107E-03
151056000004	1.5616E-05
152047010004	0.0000E-39
152050010004	0.0000E-39
152051010004	5.8463E 00
152052010004	8.9860E 01
152053010004	1.6849E 02
152054020004	8.1408E 01
152055120004	0.0000E-39
152055010004	4.6803E-06
152056000004	1.6212E-05
153050010004	0.0000E-39
153051010004	1.6250E 00
153052010004	4.7814E 01
153053010004	1.9679E 02
153054012002	4.2591E 01
153055110004	1.8287E-01
153055010004	1.9333E-01
153056010004	1.9574E-04
153057000004	2.3842E-06
154050010004	0.0000E-39
154051010004	0.0000E-39
154052010004	1.3543E 01
154053010004	1.3363E 02
154054010004	5.9430E 01
154055010004	6.2718E 00
154056000004	9.3837E-01
155050010004	0.0000E-39
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155052010004	3.2772E 00
155053010004	3.1265E 01
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	0.0000E-39

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156054010004	7.9662E 01
156055010004	3.0087E 01
156056000004	1.4564E 01
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157052010004	0.0000E-39
157053010004	3.8732E 00
157054010004	4.2305E 01
157055012002	6.1937E 01
157056112002	3.3473E 00
157056012002	1.4635E 01
157057110004	8.2725E-03
157057010004	8.3635E-03
157060000004	5.4985E-06
560052010004	0.0000E-39
160053010004	1.6279E 00
160054010004	2.2845E 01
160055010004	5.8272E 01
160056010004	3.6044E 01
160057010004	1.5585E-01
160060000004	4.1123E-05
561052010004	0.0000E-39
161053010004	0.0000E-39
161054010004	7.8235E 00
161055010004	3.9530E 01
161056010004	5.6202E 01
161057112002	2.6937E 00
161057010004	1.4893E 00
161060000004	7.5807E-03
562052010004	0.0000E-39
162053010004	0.0000E-39
162054010004	2.2601E 00
162055010004	2.5198E 01
162056010004	7.0734E 01
162057010004	5.9938E 00
162060000004	3.8667E 00
563053010004	0.0000E-39
163054010004	3.6495E-01
163055010004	1.3497E 01
163056012002	6.8365E 01
163057112301	9.9477E 00
163057012002	1.2147E 01
163060130004	5.0062E-01
163060010004	5.1933E-01
163061112002	5.7707E-06
163061010004	3.8529E-06
163062000004	1.0825E-06
564053010004	0.0000E-39
164054010004	0.0000E-39
164055010004	4.9918E 00
164056010004	4.8533E 01
164057010004	4.4612E 01
164060000004	6.8354E-01
565053010004	0.0000E-39
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165056010004	2.87[illegible]4E 01
165057012002	5.9321E 01
16[illegible]060112301	6.7880E 00

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165061113201	5.7157E-03
165061020004	4.6385E-04
165062110004	4.6566E-09
165062000004	7.8356E-06
566054010004	0.0000E-39
166055010004	5.2751E-01
166056010004	1.6044E 01
166057010004	5.4449E 01
166060020004	2.8097E 01
566061120004	9.0578E-01
166061010004	5.5333E-01
166062000004	3.9305E-01
567054010004	0.0000E-39
167055010004	3.1920E-02
167056010004	5.5433E 00
167057012002	4.3893E 01
167060120004	2.1129E 01
167060010004	2.1360E 01
167061112301	4.6127E 00
167061010004	4.1159E 00
167062110004	9.8258E-02
167062000004	4.9143E-03
570055010004	0.0000E-39
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170057010004	2.4280E 01
170060010004	5.8396E 01
170061010004	1.5641E 01
170062000004	8.5427E-01
571055010004	0.0000E-39
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171057010004	1.0472E 01
171060012002	4.4639E 01
171061130004	2.1093E 01
171061020004	1.9791E 01
571062120004	2.2464E 00
171062010004	4.0713E 00
171063000004	8.8662E-05
572056010004	0.0000E-39
172057010004	3.1642E 00
172060010004	3.9459E 01
172061010004	4.5301E 01
172062000004	2.6959E 00
572063110004	1.0111E-01
172063021042	1.0329E-01
172064000004	1.1055E-06
573056010004	0.0000E-39
173057010004	1.1659E 00
173060012002	2.2607E 01
173061130004	2.7874E 01
173061020004	2.3277E 01
573062120004	1.2401E 01
173062010004	2.1005E 01
173063000004	1.0231E-02
574056010004	0.0000E-39
174057010004	5.0255E-02
174060010004	1.2003E 01
174061010004	4.7333E 01
174062000004	6.5304E 00
574063230004	2.8641E 00

574063120004	2.7927E 00
574063010004	2.8902E 00
174064000004	1.0360E-01
575057010004	0.0000E-39
175060010004	4.0991E-01
175061012002	3.4816E 01
175062120004	3.2418E 01
175062010004	3.2559E 01
175063012002	2.0542E 01
175064110004	5.9470E-01
175064000004	4.8503E-06
576057010004	0.0000E-39
176060010004	4.4676E-01
176061010004	1.7305E 01
176062010004	6.7338E 01
176063112002	1.9014E 01
176063010004	1.9103E 01
176064000004	4.9737E-04
577057010004	0.0000E-39
177060010004	0.0000E-39
177061012002	5.8202E 00
177062120004	4.1645E 00
177062010004	6.5769E 01
177063012002	6.6546E 01
177064112002	8.9450E 00
177064010004	8.9446E 00
177065000004	7.2003E-04
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200062012002	7.6758E 01
200063120004	4.4143E 01
200063010004	4.4265E 01
200064000004	1.8310E-01
600065011042	5.5401E-01
200066000004	9.2483E-04
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201062010004	7.9405E 01
201063012002	1.1201E 02
201064112002	2.3534E 01
201064010004	2.3532E 01
201065020004	2.0846E 00
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201066000004	1.8477E-06
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202062012002	8.8494E 01
202063120004	1.3225E 00
202063010004	1.3798E 02
202064000004	1.7117E-01
602065010004	3.6198E 00
202066000004	2.1523E-04
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203061010004	1.4254E-01
203062010004	6.0738E 01
203063012002	1.6212E 02
203064112002	5.4435E 01
203064010004	5.4595E 01
203065012002	1.7702E 01
203066110004	5.3458E-07

203066000004	7.7062E-05
604060010004	0.0000E-39
204061010004	0.0000E-39
204062010004	3.1186E 01
204063010004	1.5057E 02
204064010004	1.7315E 02
204065010004	4.9586E 01
204066000004	1.6037E-02
605061010004	0.0000E-39
205062010004	1.3819E 01
205063012002	1.2093E 02
205064112002	1.1573E 02
205064010004	1.1453E 02
205065012002	1.0649E 02
205066110004	4.2946E 00
205066010004	4.2983E 00
205067000004	4.3690E-05
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206062010004	0.0000E-39
206063010004	7.9631E 00
206064010004	2.4419E 02
206065010004	2.2106E 02
206066000004	1.8597E-01
606067110004	0.0000E-39
206067010004	0.0000E-39
206070000004	0.0000E-39
607062010004	0.0000E-39
207063010004	1.1715E 00
207064010004	1.0719E 02
207065012002	2.6240E 02
207066110004	8.2610E 01
207066010004	8.3097E 01
207067010004	2.4207E 01
207070000004	4.7684E-06
610063010004	0.0000E-39
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210065010004	[illegible].8349E 02
210066000004	6.3198E 00
610067010004	8.8200E 01
210070000004	2.0981E-04
611063010004	0.0000E-39
211064010004	2.7421E 00
211065051042	1.0497E 02
211066010004	2.6407E 02
211067012002	1.5297E 02
211070110004	9.9918E 00
211070000004	1.7288E-01
612063010004	0.0000E-39
212064010004	0.0000E-39
212065061042	3.4333E 01
212066010004	2.2447E 02
212067010004	2.0740E 02
212070000004	2.8697E-01
612071010004	0.0000E-39
212072000004	0.0000E-39
613064010004	0.0000E-39
213065061042	4.7496E 00
213066010004	1.3973E 02
213067010004	2.3998E 02
213070010004	1.0305E 02

213071000004	5.3800E-02
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214065010004	3.3264E-01
214066010004	6.6962E 01
214067010004	2.2022E 02
214070010004	1.6587E 02
214071010004	2.7600E 01
214072000004	5.2547E-04
615065010004	0.0000E-39
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215067010004	1.6719E 02
215070010004	2.1031E 02
215071010004	6.0288E 01
215072010004	8.6475E-01
215073000004	1.5579E-05
616065010004	0.0000E-39
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216067010004	7.2392E 01
216070010004	2.2499E 02
216071010004	1.0789E 02
216072000004	5.7042E-02
617065010004	0.0000E-39
217066010004	3.5393E-02
217067010004	1.2847E 01
217070010004	1.6679E 02
217071010004	1.8063E 02
217072010004	3.2504E 01
217073010004	7.2289E-04
217074000004	1.8597E-05
620066010004	0.0000E-39
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220070010004	6.2296E 01
220071010004	2.0231E 02
220072010004	9.8974E 01
220073010004	2.1943E 00
220074000004	5.6762E-03
621066010004	0.0000E-39
221067010004	1.3014E-01
221070010004	1.5243E 01
221071010004	1.4203E 02
221072010004	1.3835E 02
221073010004	1.7544E 01
221074000004	2.0752E-03
622066010004	0.0000E-39
222067010004	0.0000E-39
222070010004	3.9983E 00
222071010004	6.5872E 01
222072010004	1.6548E 02
222073010004	2.9793E 01
222074000004	5.4068E-02
623067010004	0.0000E-39
223070010004	4.6892E-01
223071010004	1.7331E 01
223072010004	1.4327E 02
223073010004	5.3550E 01
223074010004	4.0801E 00
223075010004	1.3262E-05
223076000004	6.2883E-06
624067010004	0.0000E-39
224070010004	2.3343E-02

224071010004	6.3765E 00
224072010004	8.8774E 01
224073010004	6.7374E 01
224074000004	1.4918E 00
624075010004	0.0000E-39
224076000004	0.0000E-39
625070010004	0.0000E-39
225071010004	1.1121E 00
225072010004	2.2210E 01
225073010004	7.7540E 01
225074010004	2.9448E 01
225075010004	7.8972E-01
225076000004	1.5207E-05
626070010004	0.0000E-39
226071010004	6.4847E-02
226072010004	5.3468E 00
226073010004	4.4560E 01
226074000004	7.9139E 00
626075010004	5.3685E 00
226076000004	1.4781E-03
627071010004	0.0000E-39
227072010004	0.0000E-39
227073010004	0.0000E-39
227074010004	0.0000E-39
227075010004	0.0000E-39
227076010004	0.0000E-39
227077000004	0.0000E-39
630071010004	0.0000E-39
230072010004	0.0000E-39
230073010004	0.0000E-39
230074010004	0.0000E-39
230075010004	0.0000E-39
230076000004	0.0000E-39
630077112042	0.0000E-39
630077021042	0.0000E-39
230100000004	0.0000E-39
631071010004	0.0000E-39
231072010004	0.0000E-39
231073010004	0.0000E-39
231074010004	0.0000E-39
231075010004	0.0000E-39
231076010004	0.0000E-39
231077000004	0.0000E-39
632072010004	0.0000E-39
232073010004	0.0000E-39
232074010004	0.0000E-39
232075010004	0.0000E-39
232076000004	0.0000E-39
632077010004	0.0000E-39
232100000004	0.0000E-39
633072010004	0.0000E-39
233073010004	0.0000E-39
233074010004	0.0000E-39
233075010004	0.0000E-39
233076010004	0.0000E-39
233077010004	0.0000E-39
233100000004	0.0000E-39
634073010004	0.0000E-39
234074010004	0.0000E-39
234075010004	0.0000E-39

234076010004	0.0000E-39
234077010004	0.0000E-39
234100000004	0.0000E-39
635073010004	0.0000E-39
235074010004	0.0000E-39
235075010004	0.0000E-39
235076010004	0.0000E-39
235077010004	0.0000E-39
235100000004	0.0000E-39
636073010004	0.0000E-39
236074010004	0.0000E-39
236075010004	0.0000E-39
236076010004	0.0000E-39
236077010004	0.0000E-39
236100000004	0.0000E-39
637074010004	0.0000E-39
237075010004	0.0000E-39
237076010004	0.0000E-39
237077010004	0.0000E-39
237100010004	0.0000E-39
237101000004	0.0000E-39
640074010004	0.0000E-39
240075010004	0.0000E-39
240076010004	0.0000E-39
240077010004	0.0000E-39
240100000004	0.0000E-39
640101010004	0.0000E-39
240102000004	0.0000E-39
641074010004	0.0000E-39
241075010004	0.0000E-39
241076010004	0.0000E-39
241077010004	0.0000E-39
241100010004	0.0000E-39
241101010004	0.0000E-39
241102000004	0.0000E-39

OUTPUT OF FRATIO

MCHN	FR
1	0.0000E-39
2	0.0000E-39
3	0.0000E-39
4	0.0000E-39
5	0.0000E-39
6	0.0000E-39
7	0.0000E-39
8	0.0000E-39
9	1.1084E-01
10	2.1260E-02
11	5.4228E-03
12	0.0000E-39
13	0.0000E-39
14	0.0000E-39
15	2.9288E-09
16	7.3517E-09
17	2.4399E-04
18	1.2798E-02
19	6.4557E-02
20	1.5290E-01
21	5.0714E-01
22	6.3572E-01
23	8.4052E-01
24	9.5203E-01
25	9.6868E-01
26	9.9993E-01
27	9.9858E-01
28	9.5236E-01
29	9.8873E-01
30	6.1939E-01
31	3.6226E-01
32	1.9780E-01
33	6.7067E-02
34	1.1589E-01
35	2.5247E-01
36	1.5419E-01
37	3.1174E-01
38	7.8029E-01
39	8.9292E-0[illegible]
40	9.6929E-01
41	9.8631E-01
42	9.9993E-01
43	9.6421E-01
44	9.9032E-01
45	9.9308E-01
46	8.6838E-01
47	7.0727E-01
48	4.9183E-01
49	2.6471E-01
50	1.4530E-01
51	6.4522E-02
52	3.1908E-01
53	8.8328E-0[illegible]
54	5.3550E-01
55	5.4654[illegible]-01
56	4.3656[illegible]-01

57	4.5341E-01
58	3.2767E-01
59	3.7912E-01
60	1.7367E-01
61	7.7097E-02
62	2.8783E-02
63	0.0000E-39
64	8.5047E-09
65	7.0363E-07
66	1.9002E-02
67	6.1517E-04
68	2.1147E-01
69	4.0224E-01
70	6.0942E-01
71	8.1886E-01
72	9.6720E-01
73	9.9153E-01
74	9.9958E-01
75	1.0000E 00
76	1.0000E 00
77	1.0000E 00
78	1.0000E 00
79	1.0000E 00
80	0.0000E-39
81	0.0000E-39
82	0.0000E-39
83	0.0000E-39
84	0.0000E-39
85	0.0000E-39
86	0.0000E-39
87	0.0000E-39
88	0.0000E-39
89	0.0000E-39
90	0.0000E-39

ENTERING LINK 9

**** OUTPUT PROCESSOR TASK 1 ****

GRID LIMITS AND INTERVALS

XMIN	XMAX	YMIN	YMAX	DELTA X	DELTA Y
998000.	1050000.	998000.	1015000.	1500.0	1500.0

THE CONTROL VARIABLE ARRAY, JC(J), HAS BEEN GIVEN THE FOLLOWING VALUES.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 0 0 17 0

GROUND ROUGHNESS FACTOR 0.500

REQUEST NUMBER 1

TYPE 2 T1 = -0.0 T2 = -0.0 NASCHN = -0

OUTPUT OF BATMAN

NUCLID	ABUNDO
510033010004	0.0000E-39
110034010004	0.0000E-39
110035010004	0.0000E-39
110036010004	0.0000E-39
110037010004	0.0000E-39
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223072010004	1.4340E-15
223073010004	7.0229E-03
223074010004	1.5250E-04
223075010004	3.3812E-09
223076000004	0.0000E-39
624067010004	0.0000E-39
224070010004	0.0000E-39

224071010004	0.0000E-39
224072010004	1.4295E-27
224073010004	7.0270E-10
224074000004	0.0000E-39
624075010004	0.0000E-39
224076000004	0.0000E-39
625070010004	0.0000E-39
225071010004	0.0000E-39
225072010004	0.0000E-39
225073010004	1.9766E-36
225074010004	8.9035E-03
225075010004	1.3905E-04
225076000004	0.0000E-39
626070010004	0.0000E-39
226071010004	0.0000E-39
226072010004	0.0000E-39
226073010004	0.0000E-39
226074000004	0.0000E-39
626075010004	2.9624E-04
226076000004	0.0000E-39
627071010004	0.0000E-39
227072010004	0.0000E-39
227073010004	0.0000E-39
227074010004	0.0000E-39
227075010004	0.0000E-39
227076010004	0.0000E-39
227077000004	0.0000E-39
630071010004	0.0000E-39
230072010004	0.0000E-39
230073010004	0.0000E-39
230074010004	0.0000E-39
230075010004	0.0000E-39
230076000004	0.0000E-39
630077112042	0.0000E-39
630077021042	0.0000E-39
230100000004	0.0000E-39
631071010004	0.0000E-39
231072010004	0.0000E-39
231073010004	0.0000E-39
231074010004	0.0000E-39
231075010004	0.0000E-39
231076010004	0.0000E-39
231077000004	0.0000E-39
632072010004	0.0000E-39
232073010004	0.0000E-39
232074010004	0.0000E-39
232075010004	0.0000E-39
232076000004	0.0000E-39
632077010004	0.0000E-39
232100000004	0.0000E-39
633072010004	0.0000E-39
233073010004	0.0000E-39
233074010004	0.0000E-39
233075010004	0.0000E-39
233076010004	0.0000E-39
233077010004	0.0000E-39
233100000004	0.0000E-39
634073010004	0.0000E-39
234074010004	0.0000E-39
234075010004	0.0000E-39

234076010004	0.0000E-39
234077010004	0.0000E-39
234100000004	0.0000E-39
635073010004	0.0000E-39
235074010004	0.0000E-39
235075010004	0.0000E-39
235076010004	0.0000E-39
235077010004	0.0000E-39
235100000004	0.0000E-39
636073010004	0.0000E-39
236074010004	0.0000E-39
236075010004	0.0000E-39
236076010004	0.0000E-39
236077010004	0.0000E-39
236100000004	0.0000E-39
637074010004	0.0000E-39
237075010004	0.0000E-39
237076010004	0.0000E-39
237077010004	0.0000E-39
237100010004	0.0000E-39
237101000004	0.0000E-39
640074010004	0.0000E-39
240075010004	0.0000E-39
240076010004	0.0000E-39
240077010004	0.0000E-39
240100000004	0.0000E-39
640101010004	0.0000E-39
240102000004	0.0000E-39
641074010004	0.0000E-39
241075010004	0.0000E-39
241076010004	0.0000E-39
241077010004	0.0000E-39
241100010004	0.0000E-39
241101010004	0.0000E-39
241102000004	0.0000E-39

OUTPUT OF GXPSR

PARTICLE SIZE MICRONS	FISSION PROCUCT ACTIVITY (R*M**2)/HR
7.7965E 03	2.6227E 08
4.3673E 02	3.1976E 08
2.5825E 02	3.4085E 08
1.7168E 02	3.6162E 08
1.1940E 02	3.8434E 08
8.4075E 01	4.1113E 08
5.8469E 01	4.4532E 08
3.8870E 01	4.9397E 08
2.2985E 01	5.7853E 08
1.2875E 00	2.4892E 09

TOTAL FAM OUTPUT

PSIZE	FP
7.1955E 03	2.6392E 08
4.3673E 02	3.2141E 08
2.5875E 02	3.4250E 08
1.7168E 02	3.6327E 08
1.1940E 02	3.8599E 08
8.4075E 01	4.1278E 08
5.8469E 01	4.4698E 08
3.8870E 01	4.9563E 08
2.2985E 01	5.8018E 08
1.2875E 00	2.4869E 09

MAPPED ON GRID INTERVALS DGX = 1500.0 DGY= 1250.0

THE OUTPUT PRESENTATION IS A
TWO-LINE E FORMAT MAP

THE QUANTITY PRESENTED IS
DOSE RATE NORMALIZED TO TIME H+1 HOUR.
GROUND ZERO IS LOCATED AT X = 1000000.0 , Y = 1000000.0

Y-COORDINATE SCALES FOR SIDES OF MAP

1014250.	1014250.
1013000.	1013000.
1011750.	1011750.
1010500.	1010500.
1009250.	1009250.
1008000.	1008000.
1006750.	1006750.
1005500.	1005500.
1004250.	1004250.
1003000.	1003000.
1001750.	1001750.
1000500.	1000500.
999250.	999250.

STRIP 1

999500. ***** 1007000. ***** 1014500. *****

0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	1 3.100	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	1 3.100	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	1 1.550	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	1 4.649	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	1 1.459	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	1 2.917	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	1 1.459	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	1 1.375	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	2 1.650	1 1.375	1 1.375	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	2 1.549	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000
0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000	0 0.000

999500. ***** 1007000. ***** 1014500. *****

```
STRIP  2

*******          *****   1035500.          *****   1043000.                 *****

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0 000 0.000 0.000 0.000 0.000

     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
     0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

*******          *****   1035500.          *****   1043000.                 *****

          SUM OF MAP ORDINATES =  0.543472E 03
```

* * * * * *

REQUEST NUMBER 2

TYPE 10 T1 = -0.0 T2 = 0.0 MASCHN = 89

OUTPUT OF MCHDEP

PARTICLE SIZE MICRONS	ACTIVITY OF MASS CHAIN 89 FISSIONS
7.7965E 03	2.1632E
4.3673E 02	2.6919E 21
2.5825E 02	3.0321E 21
1.7168E 02	3.4307E 21
1.1940E 02	3.9293E 21
8.4075E 01	4.5898E 21
5.8469E 01	5.5290E 21
3.8870E 01	7.0169E 21
2.2985E 01	9.9243E 21
1.2875E 00	1.0269E 23

TOTAL ABUNDANCE OF+MASS CHAIN 89 WAS 1.4500E 23 FISSIONS

TOTAL PAM OUTPUT

PSIZE	FP
7.7965E 03	2.1632E 21
4.3673E 02	2.6919E 21
2.5825E 02	3.0321E 21
1.7168E 02	3.4307E 21
1.1940E 02	3.9293E 21
8.4075E 01	4.5898E 21
5.8469E 01	5.5290E 21
3.8870E 01	7.0169E 21
2.2985E 01	9.9243E 21
1.2875E 00	1.0269E 23

MAPPED ON GRID INTERVALS DGX = 1500.0 DGY= 1250.0

THE OUTPUT PRESENTATION IS A
TWO-LINE E FORMAT MAP

THE QUANTITY PRESENTED IS
ACTIVITY AT TIME -0.0 DUE TO MASS CHAIN 89
ASSUMES ALL PARTICLES ARE GROUNDED BY T1.
GROUND ZERO IS LOCATED AT X = 1000000.0 , Y = 1000000.0

Y-COORDINATE SCALES FOR SIDES OF MAP

1014250.	1014250.
1013000.	1013000.
1011750.	1011750.
1010500.	1010500.
1009250.	1009250.
1008000.	1008000.
1006750.	1006750.
1005500.	1005500.
1004250.	1004250.
1003000.	1003000.
1001750.	1001750.
1000500.	1000500.
999250.	9250.

STRIP 1

999500. ***** 1007000. ***** 1014500. *****

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0	0	0	0	0	0	0	0	0	0	0	0	14	14	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.155	3.155	0.000	0.000	0.000	0.000
0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.155	0.000	0.000	0.000	0.000	0.000
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.466	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.755	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.265	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.755	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	2.435	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0	0	15	14	14	0	0	0	0	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	2.922	2.435	2.435	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

999500. ***** 1007000. ***** 1014500. *****

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STRIP  2

*******          *****     1035500.          *****     1043000.                         *****

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

    0     0     0     0     0     0     0     0     0     0     0     0     0     0
    0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

*******          *****     1035500.          *****     1043000.                         *****

           SUM OF MAP ORDINATES =   0.692306E 16
OUTPUT PROCESSING IS COMPLETED.
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UNCLASSIFIED
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DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

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LAND FALLOUT PREDICTION SYSTEM
Volume VII - Operator's Manual

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (First name, middle initial, last name)

David K. Winegardner

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d.	

10. DISTRIBUTION STATEMENT

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11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	Defense Atomic Support Agency

13. ABSTRACT

This volume of the DELFIC (Defense Land Fallout Interpretive Code) documentation is intended to serve as a complete operator's manual to be used at a computing center by personnel responsible for the execution of production computations. It includes material presented in the program Description and User Information Sections of Volumes II through VI. In addition to this material it also contains detailed information on certain aspects of the DELFIC system that could not approximately be included elsewhere. It is assumed that the user is familiar with the IBSYS operating system of the IBM 7094.

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UNCLASSIFIED
Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
DELFIC						
FALLØUT PREDICTIØN						
MULTIPLE BURSTS						